COMPREHENSIVE SITE ASSESSMENT
INTERIM REPORT

OLD FALL RIVER ROAD LANDFILL
452 OLD FALL RIVER ROAD, DARTMOUTH

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1.0 INTRODUCTION

This Comprehensive Site Assessment (CSA) - Interim Report has been prepared on behalf of Boston Environmental, Corporation (BEC) for submission to the Massachusetts Department of Environmental Protection's (MassDEP) as part of the final closure assessment of the Old Fall River Road Landfill (Landfill) in Dartmouth, MA. BEC and Mary Robinson, the current owner of the propoerty, have entered into an Administrative Consent Order (ACO) (#ACO-SE-14-4001) with the MassDEP to facilitate the closure of the Landfill. BEC will function as the contractor which will cap and close the Landfill in accordance with the requirements of the ACO, the Massachusetts Solid Waste Management Regulations at 310 CMR 19.000 and applicable MassDEP policies and guidelines.

This CSA Interim Report has been prepared to meet the requirements of Paragraph 52. B of the ACO and Condition No. 9 of MassDEP's August 14, 2014 approval of the Initial Site Assessment/ Comprehensive Site Assessment Scope of Work (ISA/CSA-SOW).

1.1 Project Area Description

The Landfill and the associated environmental monitoring devices are located parcels of land shown on Town of Dartmouth Assessors Map 72 as Lots 6, 8, and 9, herein referred to as the "Site". The Landfill address is 452 Old Fall River Road in Dartmouth, Massachusetts. The Landfill was an active landfill from 1954 to 1974. The Landfill was privately operated and was used primarily for the disposal of construction and demolition waste during this period. The materials that were placed in the landfill generally consisted of demolition debris, brick, concrete and granite, along with scrap metal and tires.

The Site is bisected by an active Algonquin Gas transmission line and a New England Electric electrical transmission line. BEC advanced 44 test pits at the site, the results of which established that the extent of buried waste from the historic landfilling operation is approximately 25 acres in size. Logs of these test pits are included in Appendix B-8 and the locations of the test pits and limit of buried waste is included on the *Site Preparation Grading Plan* included in Part E - Drawings of the Corrective Action Design (CAD) Application that has been submitted to the MassDEP.

The area which was used for landfilling (the "Landfill") is surrounded by the Algonquin Gas line on one side and wetlands on the other three sides. The Landfill is listed as an inactive, uncapped landfill according to the MassDEP Facility Master File listing. The land surrounding the Landfill is predominately wooded and undeveloped. Some residential homes and one commercial property, Gosselin & Sons Landscape Materials, are located to the north of the Site. Residential properties and undeveloped land abuts the Site to the south and undeveloped land along Old Fall River Road abuts the Site to the east. The Site is bordered to the west by residential properties, wetlands and woodland and the Cole Brook Swamp. The Site is bordered by Old Fall River Road to the north and Hixville Road to the south.

The topography of the area surrounding the Site gently slopes from east to west. Stormwater runoff from the Site ultimately drains into the Cole Brook Swamp located to the north and west of the Landfill and then into an unnamed stream that extends from the east side, across the north side and along the west side of the Landfill.

1.2 Site History

In 1954 a sand and gravel excavation operation began on Site and portions of the Site were used for disposal of solid waste, primarily demolition debris. The area of the sand and gravel excavation operation was subsequently used for waste disposal.

In the 1960s the Site was used for the disposal of demolition debris which generally consisted of brick, wood, steel granite, and general demolition debris from buildings. During this period the Site was also used to store salvageable materials principally scrap metals.

These practices continued until 1983 when the operations ceased.

On March 28, 2014, MassDEP issued an Administrative Consent Order ACO-SE-14-4001, which found that BEC's final/revised "Conceptual Closure Proposal" met the requirements of the "Inactive Landfill Closure Guidelines", and notified the Respondents and the property owner that they could proceed with the preparation and submission of requisite permit applications pursuant to the applicable requirements set forth at 310 CMR 19.000, and as required by the Consent Order regarding the assessment and closure of the Landfill.

On May 20, 2014 SITEC, on behalf of BEC, submitted the ISA/CSA-SOW to MassDEP, in accordance with the ACO. On August 14, 2014 MassDEP conditionally approved the ISA/CSA-SOW, initiating the CSA work, which is the subject of this CSA Interim Report.

1.3 Initial Site Assessment Summary

A comprehensive research program was undertaken as part of the ISA to determine the history of the Landfill and the surrounding properties. The Landfill has been the subject of several environmental investigations since the mid 1980s. Several different proposals to either use the site for expanded landfill operations or for final closure have not gone forward.

A 2013 study completed by Haley & Aldrich, Inc. (H&A) on behalf of BEC provided data that indicates the shallow groundwater direction beneath the Site is westerly. This determination was based on the measured elevations of groundwater in monitoring wells installed as part of previous studies, as well as the H&A 2013 study. Also H&A determined that the Landfill has had a minimal impact on shallow groundwater quality in the vicinity of the Landfill. The affects to the deep overburden groundwater and bedrock aquifers are being addressed in this CSA, along with an evaluation of flow/migration of constituents of concern (COC). The locations of monitoring wells that were installed as part of this CSA are based on the inferred westerly groundwater flow.

1.4 Scope of the Comprehensive Site Assessment

The *Initial Site Assessment and Comprehensive Site Assessment - Scope of Work, SITEC Environmental, Inc., May 20, 2014* recommended the following tasks to characterize and delineate the extent of any contamination, to evaluate exposure pathways and to quantify the risk (if any) to human health, safety and the environment posed by the Landfill.

- Installation of clusters of additional monitoring wells so that there would be one shallow overburden, one deep overburden and one shallow bedrock well at each location. The proposed CSA-SOW included a protocol for the installation of the additional monitoring wells at four locations (HA-1, HA-2, SGA-01S and SGA-04). At a minimum, the scope of work includes the installation of deep overburden monitoring wells and bedrock monitoring wells at the four locations.
- Install and sample landfill gas screening probes for the purpose of locating permanent soil-gas monitoring wells.
- Survey of the monitoring wells and surface water sampling locations for horizontal location and elevation in order that groundwater and surface water elevations can be determined, and groundwater contour and flow direction maps can be developed.
- Groundwater, surface water, private water supply well and sediment sampling and analysis.
- Rising Head Slug Test to determine the hydraulic conductivity of the three hydrogeologic units.
- Interpretation of hydrogeologic and analytical data for incorporation into a report.

2.0 FIELD INVESTIGATIONS

This section describes the objectives and the activities that were conducted as part of these field investigations. The field investigation activities included advancing soil borings, groundwater monitoring well installation, establishing surface water and sediment sampling locations, an initial round of groundwater, surface water and sediment sampling and analysis, sampling identified residential water supply wells, and the installation and screening of landfill gas monitoring probes.

2.1 Objectives of the Field Investigations

The stated objectives of the CSA were as follows:

- Define the parameters of the overburden and shallow bedrock hydrogeologic units, including groundwater flow direction and hydraulic conductivity,
- Determine if the Landfill has had any negative impact on the environment,
- Identify and evaluate any downgradient impacts to groundwater, and
- Identify and characterize the extent of environmental impacts that may be present at the site.

2.2 Soil Borings and Groundwater Monitoring Well Installation

2.2.1 Well Locations and Evaluation

There has been an existing groundwater monitoring well network located in the vicinity of the Landfill. This network was evaluated for suitability for sampling as part of this CSA. Based upon the recommendations included in the ISA/CSA-SOW, additional groundwater monitoring wells were installed to evaluate deep overburden groundwater and the shallow bedrock aquifer characteristics. The new wells were installed under the direction of SITEC in September 2014. The new well locations were selected on a presumed local groundwater flow direction to the west, based on previous groundwater elevation measurements. A description of the previously existing network and new monitoring wells are as follows.

Evaluation of Existing Monitoring Wells

In 2013 H&A conducted environmental investigation work that included the redevelopment and sampling of existing groundwater monitoring wells and the installation of six new groundwater monitoring wells. In its investigation H&A located and inspected eight previously installed groundwater monitoring wells and redeveloped and sampled seven of them. There were six other previously existing monitoring wells that were not located. During this CSA field work, SITEC found two other previously installed wells (MW-03 and SGA-2) and have incorporated them into the CSA investigation work. Reportedly, H&A inspected each well to determine that they would produce representative groundwater samples, and did not appear to be tampered with or damaged.

The six H&A wells were installed in accordance with MassDEP's approval. As described in the ISA/CSA-SOW, well construction logs had not been located for all of the existing monitoring wells at that time. Specifically the SGA-## well series logs had not been available. Subsequent to the submission of the ISA/CSA-SOW, boring and monitoring well construction logs for the SGA-## series wells were obtained by SITEC, with assistance from St. Germain-Collins, the consultant that originally installed those wells. The boring and well construction logs that have been located to date are included in Appendix A. See Figure 2 - Environmental Monitoring Plan for the locations of the monitoring wells, as well as other sampling locations.

As shown on Figure 3 of the ISA/CSA-SOW, inferred local shallow groundwater flow is generally from east to west. Including the previously existing wells located during the CSA work, there were at the time, fifteen existing groundwater monitoring wells in fourteen locations. The Scope of Work proposed in the ISA/CSA-SOW was to use a subset of seven of the existing well locations for further assessment in the CSA. The seven locations that were not included in further assessment work are either upgradient or crossgradient from the Landfill. One change from the original ISA/CSA-SOW recommendations was to replace the use SGA-04 in the CSA with MW-03, since MW-03 is in a direct line with SGA-04 and is closer to the Landfill.

The monitoring wells that had been located and sampled in 2013 by H&A, with one exception, were all screened across the groundwater table surface. The exception is monitoring well SGA-01D, which is upgradient of the Landfill and reported as being 53.1 feet deep, which purportedly puts it in the deep overburden at the top of bedrock. Further investigation of deep overburden and bedrock downgradient, cross gradient and upgradient locations was proposed and subsequently approved by MassDEP. The following summarizes the new monitoring wells that have been installed as part of this CSA program in order to complete these investigations.

Description of New Monitoring Wells

HA-1D & HA-1B: These monitoring wells are located immediately west and downgradient of the Landfill. Monitoring well HA-1, a shallow overburden well, is also at this location. The purpose of these new wells is to monitor groundwater quality at what is presumed to be directly downgradient of the Landfill, in deep overburden groundwater (HA-1D) and bedrock (HA-1B) aquifer.

HA-2D & HA-2B: These monitoring wells are also located immediately west and downgradient of the Landfill, about 480 feet north of the HA-1 monitoring well group. Monitoring well HA-2, a shallow overburden well, is also at this location. The purpose of these new wells is to monitor groundwater quality at what is presumed to be directly downgradient of the Landfill, in both the deep overburden groundwater (HA-2D) and the bedrock (HA-2B) aquifer.

MW-03B: This monitoring well is located at least 400 feet south and crossgradient of the Landfill. Monitoring well MW-03, a shallow overburden well, is also at this location. The boring for MW-03 extended to 13 feet below the ground surface according to Weston Solution's boring log (Appendix A). When the boring was conducted to install the deep overburden and bedrock wells, bedrock was encounter at a depth of less than 21 feet. With no more than an eight foot interval between the shallow overburden well (MW-03) and bedrock, the deep overburden well was not installed. Originally, as proposed in the ISA/CSA-SOW, this crossgradient monitoring location was to be installed at SGA-04. After locating the previously unlocated MW-03, SITEC recommended, and MassDEP approved, this change in location of the new well. The purpose of this new well is to monitor groundwater quality at what is presumed to be crossgradient of the Landfill, in the bedrock (MW-03B) aquifer. This location will determine if there has been any migration of contamination toward the south, in the upland areas.

SGA-01B: This single monitoring well is located immediately east and upgradient of the Landfill. Monitoring wells SGA-01S (shallow overburden) and SGA-01D (deep overburden) are also at this location. The purpose of this new well is to monitor groundwater quality in the bedrock aquifer at what is presumed to be directly upgradient of the Landfill and non-impacted by it.

2.2.2 Drilling Procedures

All drilling procedures, including soil boring, soil sampling and classification and field tests conformed to the applicable engineering methods as defined by the American Society for Testing and Materials (ASTM) Standards and DEP's Standard References for Monitoring Wells (DEP Publication # WSC-310-91).

Prior to arriving at the Landfill, the equipment used in drilling and monitoring well installation work was cleaned to remove possible contaminants encountered during drilling work at other locations. All equipment which could come in contact with the soil and groundwater were cleaned. All casings, rods, bits etc. were cleaned at the original hole location to remove soil that might lead to cross contamination of the new boring hole.

The borings were drilled using a track mounted drill rig utilizing drive and wash methods. No oil, grease, or any other petroleum base products were used to lubricate casings or rods in such a manner as to contaminate the boreholes. Care was taken that no oil, grease or other lubricants leaked from the drill rig and entered the borehole.

2.2.3 Soil Sampling Procedures

Split spoon soil samples were collected from each drilling location at approximate 5 foot intervals and were visually classified and logged by the field geologist and the drilling foreman. The logs contain the following information (refer to Appendix A for the boring logs):

1. Details for each boring arranged in tabular form; giving full information on the vertical arrangement, thickness, and classification of the material penetrated;

2. Depth of bottom, type and number of each sample taken;

3. Size, length, and depth of bottom of casing used in each borehole;

4. Depth to groundwater table at each borehole and time of observation;

5. A visual description of samples;

6. Amount of soil sample recovery in each split spoon;

7. General stratigraphic description; and

8. Notes pertaining to drilling difficulty or other pertinent information.

Representative portions of each split-spoon sample were placed in screw top, airtight, clear-glass jars as soon as they were taken, in order to preserve the original moisture content. The jars were sealed with aluminum foil, tightly capped and suitably boxed, marked and identified with labels or by inscription of the jar cap. The well location number, sample number, depth at which the sample was taken, record or number of blows for each 6-inches drive increment and length of recovery were recorded on each jar. Field screening was done using a photo-ionization detector (PID) with a 10.2 electron volt lamp. The headspace soil sample screening was done in accordance with MassDEP Policy #WSC-400-89 titled "Management Procedures for Excavated Soils Contaminated with Virgin Petroleum Oils".

The soil sample yielding the highest PID reading from each boring was analyzed for the same parameters as the groundwater samples with the exception of indicator parameters. Soil samples were also to be analyzed if the physical evidence of contamination indicated that a significant ash layer was present, but there was no evidence of ash in the samples. The samples were analyzed by Alpha Analytical Laboratories, a MassDEP certified laboratory. The laboratory analytical reports for soil samples are included in Appendix B.

2.2.4 Monitoring Well Construction

Overburden Monitoring Well Construction

The monitoring wells were constructed as outlined below:

1. Drove a 6-inch steel casing to the desired depth, with the soil then being washed out of the casing using a water bit;

2. Install a 2-inch inside diameter, schedule 40, flush-threaded, PVC riser pipe to a 0.010-inch slotted well screen. Depending on the geologic formation, the well screens was five to ten feet (5' - 10') in length. No glue, tape or other solvent containing materials was used to join pipe together;

3. Installed an Ottawa Sand Pack to 2 feet above the top of screen while retracting the augers in a manner to prevent bridging of the sand or gravel between the casing and well pipe;

4. Installed a 2-foot layer of bentonite pellets or chips on top of the sand or gravel pack while retracting the casing 2 feet to prevent bridging. The pellets were hydrated if installed above the water table;

5. Grouted the remaining borehole from the bottom up via a tremie pipe system with a lean mixture of Portland cement and bentonite (powder) at a ratio of 20:1 until the grout flows at the surface;

6. Retracted the casing; and

7. Installed a 4-inch protective steel casing with a locking cap. The protective steel casing was steamed cleaned before being placed over the PVC to remove cutting oils or grease. The sleeve was installed at least 3 feet below the surface. Locks on all wells are identical and are capable of being opened by one set of keys.

Bedrock Monitoring Well Construction

The borings were advanced one foot into the top of competent bedrock, using 6-inch inside diameter flush joint casing. Split-spoon samples were be obtained in the overburden using a 2-inch outside diameter (OD), 24 inch long split-spoon sampler in accordance with ASTM-D-1586 (ASTM, 1983). The spoon was advanced using a 140 pound hammer where the overburden material density is low and a 300 pound hammer where the material is either extremely coarse or dense material is encountered. Geologic descriptions of the samples were performed in the field and a geologic log prepared in accordance with the Modified Burmister System.

The bedrock was then cored using a NX core barrel in runs of five feet in order to determine the vertical location of the well screens. A 4-inch roller bit was then spun to open up the core hole to the appropriate depth.

Inside the borehole, a monitoring well was constructed using two-inch inside diameter Schedule 40 PVC screen (10-slot), with a riser pipe. The annular space around the well screen was backfilled with a medium Moray sand to two-feet above the well screen. The remainder of the annular space around the riser pipe was backfilled with a bentonite slurry to a depth three feet below the ground surface. The purpose of the complete bentonite slurry seal is to ensure a seal of all void spaces in the bedrock and upper soil horizons and prevent possible grout contamination through interconnected fractures in the bedrock. The wells were finished with a protective (locking) casing.

2.2.5 Monitoring Well Development

After the monitoring wells were installed, the bedrock and overburden monitoring wells were purged to enhance the hydraulic connection between the well screen and the aquifer by removing cuttings, fine soil material (silt and clay) or drill cuttings. The monitoring wells were purged using a battery powered submersible pump. The completed wells were surveyed to the nearest foot (1 ft.) horizontally and to the nearest one hundredth foot (0.01 ft.) vertically, for location and elevation of the top of well casing, and the ground surface. The location of each well was determined, in terms of latitude and longitude, by a hand held GPS unit. *Table 1, Groundwater Monitoring Well Data* is a listing of the physical characteristics of each monitoring well.

2.3 Groundwater and Surface Water Sampling and Analysis

The approved Sampling and Analysis Plan was designed to conform to the requirements in 310 CMR 19.132 and the additional requirements of the approved scope of work. To date the monitoring program has consisted of one round of groundwater and surface water sampling.

Groundwater samples were collected from all of the designated monitoring wells. Surface water samples were collected from two of the three locations described in the CSA Scope of Work. SW-1 was dry at the time of the sampling. The locations of the monitoring wells and the surface water sampling locations are shown on Figure 2, Environmental Monitoring Plan.

2.3.1 Sampling Procedures

All groundwater sampling at the Landfill was performed by SITEC personal. After an appropriate period of stabilization following installation of the groundwater monitoring wells, groundwater samples were collected from the monitoring wells in accordance with the MassDEP's Standard References for Monitoring Wells (DEP Publication # WSC-310-91).

Prior to sampling the monitoring wells, the static water level and total depth of each well was measured to the nearest 0.01 of a foot. The highest portion of the PVC well riser was used as the permanent reference point. Once the volume of standing water was calculated, the well was purged consistent with the procedures presented in Section 6.2-2 of the *Standard References for Monitoring Wells*. Overburden wells were purged using a submersible pump. A quality assurance sample (duplicate) was collected. All groundwater samples were submitted to the laboratory for analysis on the day of collection.

During the purging of the each well, field measurements were recorded for Temperature (°C), Specific Conductance (mS/cm), pH, Dissolved Oxygen (mg/l), Oxidation-Reduction Potential (ORP) (+/- mv), and Turbidity using a Hanna HI9828 Water Quality Meter. The Water Quality Meter was used in batch samples taken from the submersible pump. Purging was considered complete when one of the following conditions were met:

1. Three standing volumes of water had been removed and the pH, specific conductance, ORP, and temperature of the groundwater had stabilized,

2. Five standing volumes of groundwater had been removed, or

3. The well had been purged dry.

Information collected during the purging and sampling of each well was recorded on the Groundwater Sampling Field Logs, which are included as Appendix C.

The following procedure was used during sample collection:

- Groundwater samples were collected using a using a disposable bailer.
- Surface water samples were collected by immersing the sample containers into the water.
- Each water sample obtained for VOC analyses was placed in EPA-approved 40-ml glass vials which were pre-preserved with hydrochloric acid (HCl). Care was taken not to agitate the samples or develop air bubbles in the tubing during collection in order to avoid the potential loss of volatile constituents.
- Samples obtained for cyanide analyses were preserved with sodium hydroxide (NaOH) to a pH of 12.
- Samples obtained for chemical oxygen demand (COD) analysis were preserved with sulfuric acid (H_2SO_4) to a pH of 2.
- Samples collected for dissolved metals analysis were field filtered through a 0.45 micron membrane filter, preserved with nitric acid (HNO_3) to a pH less than 2, then subsequently analyzed for dissolved metals.

Samples were packed in ice immediately following sample collection and transported to Alpha Analytical Laboratories, following EPA and MassDEP Chain of Custody Procedures.

2.3.2 Analytical Protocol

For this initial sampling event the groundwater samples were analyzed for the following parameters:

pH (in situ)
Alkalinity
Temperature (in situ)
Specific conductance (in situ)
Nitrate (as nitrogen)
Total Dissolved Solids
Chloride
Calcium
Sodium
Iron
Manganese
Sulfate
Chemical Oxygen Demand
Dissolved Oxygen (in situ)
Arsenic
Barium
Cadmium
Chromium
Copper
Cyanide
Lead
Mercury
Selenium
Silver
Zinc
VOCs (EPA Method 8260) (plus MEK, MIK, Acetone & 1,4 Dioxane)
SVOCs (EPA Method 8270)

The samples were analyzed by Alpha Analytical Laboratory. Laboratory results including the laboratory's QA/QC reports, are provided in the Laboratory Analytical Reports for Groundwater and Surface Water included in Appendix D.

2.4 Sediment Sampling and Analysis

2.4.1 Sediment Sampling Locations

As part of the CSA sampling program, sediment samples were obtained from the three surface water sampling locations (SD-1, SD-2 and SD-3) all of which were located within the stream that flows along the easterly, northerly and westerly sides of the site.

2.4.2 Sediment Sampling Procedures

The sediment samples were collected using a dedicated pre-cleaned hand trowel and a dedicated pre-cleaned HDPE pail. Each dedicated trowel and pail was cleaned prior to collection by: 1.) Rinsing with tap water, 2.) Washing and scrubbing with an alconox solution, 3.) Rinsing thoroughly with tap water, 4.) Rinsing with methanol, 5.) Rinsing thoroughly with deionized water, and 6.) Allowing to air dry. Once dry, each trowel and bucket was placed into individually sealed plastic bags.

Each sediment sample was collected from the ground surface to approximately six inches deep using the dedicated pre-cleaned hand trowel. Any leaf litter was removed from the surface and the sediment was then placed into the dedicated pre-cleaned pail. Sediment was then mixed in the pail and transferred into a laboratory supplied pre-cleaned 8 ounce glass jar. Each sample was labeled and placed on ice inside a cooler.

The sediment samples were then delivered to Alpha Analytical Laboratory for analysis. The sediment samples were tested for semi-volatile organic compounds (SVOCs), total metals, Polychlorinated biphenyls (PCBs), and pesticides. The laboratory analytical reports for sediment samples are included in Appendix B. The locations of the sediment sampling points are shown on Figure 2, Environmental Monitoring Plan.

2.5 Private Water Supply Well Sampling and Analysis

MassDEP required that two private residential water supply wells that are located within 500 feet of the Landfill be sampled as part of CSA Scope of Work. The two residential wells are located at 460 Old Fall River Road and at 1 Stonefield Lane. The samples collected from these wells are identified as PW-265 and PW-266, respectively. The residential wells are shown on Figure 2, Environmental Monitoring Plan.

After checking with the owner of 460 Old Fall River Road that there were no treatment provisions, such as a filter or water softening units on their water supply, the sample was obtained directly from an outside spigot. The residential water system at 1 Stonefield Lane was reported to include a filter by the owner, so the sample was taken from inside the house, prior to the filter.

The water at each residence was allowed to run for about ten minutes to assure that the sample that was obtained was coming directly from the well and not from a storage component of the pumping system or piping. The samples were analyzed by Alpha Analytical for the parameters listed in Section 2.3.2, which are the same as analyzed for groundwater. The laboratory analytical reports for the residential water supply wells are included in Appendix E.

2.6 Landfill Gas Monitoring

The purpose of the landfill gas survey was to delineate areas of landfill gas migration within the vadose zone (unsaturated soils) around the perimeter of the Landfill. Landfill gases are known to migrate both vertically and horizontally away from the solid waste buried in a Landfill. By screening landfill gas samples collected from locations beyond the Landfill perimeter, it is possible to determine, first, if there is Landfill gas migration, and second, if there is migration, what are the migration pathways.

2.6.1 Landfill Gas Probes

The landfill gas survey involved the installation of five gas probes beyond the southern perimeter of the Landfill. The east, north and south sides of the Landfill are abutted by a stream, which serves as a barrier to gas migration beyond the limit of the stream. The probes were installed within the Landfill property and outside the limit of refuse. The locations of the landfill gas probes are shown on Figure 2, Environmental Monitoring Plan. The spacing of the gas probes was based in part on the Landfill Assessment and Closure Guidance (LAC) Manual (revised 1997). The distance between the gas probes was less than 500 feet, as suggested in the LAC Manual for locations adjacent to public access land.

Each landfill gas probe consists of a five foot length of 1", slotted PVC pipe set into the groundwater table. To install the probes, a boring was made with a direct push tracked mounted rig. The PVC screen was installed to within 1 foot of the ground surface, then the casing was withdrawn. The annular space surrounding the PVC screen was filled with clean filter sand to within one foot of the ground surface. The remaining space was filled with a granular bentonite seal in order to form a seal around the probe. At each location, the top of the probe is fitted with a barb tip and an HDPE tube, as a sampling port. The tubing was plugged.

In order to simulate a buildup of landfill gases in a confined space, an initial sample was collected from the unpurged probe. If concentrations of landfill gas were detected, the probe was then purged of two volumes (including the sand pack) and a second sample was collected.

Gas probe samples were field screened for percent Lower Explosive Limit (LEL), percent oxygen, hydrogen sulfide, carbon monoxide, and percent methane using a multi gas meter.

3.0 SITE CONDITIONS

The Initial Site Assessment (ISA) presented a description of regional and local geologic and hydrogeologic conditions in the vicinity of the Landfill. The ISA description was based on a review of available and relevant publications and studies that had been performed at and in the vicinity of the Landfill. Subsequent CSA documents will expand upon the initial research discussions by comparing those literature descriptions to conditions observed from the field investigation work of the CSA.

3.1 Groundwater Levels and Flow Directions

Groundwater elevations were developed from depth to groundwater measurements collected at each monitoring well location during the initial sampling event. The groundwater elevations are based on feet above Mean Sea Level. *Table 2 - Groundwater Elevation Data* provides water elevations for the groundwater monitoring wells measured during the initial September 2014 sampling event. Groundwater contours were interpolated from this elevation data. Groundwater elevations and contours, as determined by measurements from the shallow monitoring wells, for the September 2014 sampling event are plotted on Figure 3, Groundwater Contour Plan.

Based on the current monitoring well network, groundwater appears to flow in a west to west-northwest direction, from the Landfill, at a slope of approximately 0.01 feet/feet. This is consistent with the vicinity's general topography. Based upon the differential in elevations at the well clusters HA-1, HA-2 and MW-03, it appears to be a slight vertical downward component to the groundwater flow at the Landfill.

4.0 ENVIRONMENTAL QUALITY EVALUATION

This section assesses environmental conditions at and in the vicinity of the Landfill based on the results of environmental sampling conducted as part of the first round of CSA sampling and comparing those results to available historical data presented by others and to applicable regulatory standards. Media sampled included groundwater, surface water, soil, sediment, residential water supply wells and landfill gas (refer to Section 2.0). The sampling locations are identified on *Figure 2, Environmental Monitoring Plan*.

The evaluation of the environmental quality data involved the following:

- Comparing analytical results with data from background and upgradient locations;
- Identifying any exceedances of Massachusetts Primary Drinking Water Standards (MDWS) and the Massachusetts Contingency Plan (MCP) Method 1 Risk Characterization Standards in groundwater, and surface water;
- Identifying any exceedances of non-health based Massachusetts Secondary Drinking Water Standards (SMCL) in groundwater and surface water;
- Identifying any exceedances of Massachusetts Office of Research and Standards (ORS) Guidelines in groundwater and surface water;
- Identifying any exceedances of the Massachusetts Contingency Plan (MCP) Method 1 Risk Characterization Standards in soil;

- Identifying any exceedances of the Massachusetts Contingency Plan (MCP) Method 1 Risk Characterization Standards and the Sediment Screening Criteria in sediment;

- Identify any exceedances in surface waters to the National Recommended Water Quality Criteria.

- Discussion of any trends in contaminant concentration, when compared to historical data that has been presented by others;

- Identification of groundwater contaminant plumes; and,

- Results of Landfill gas sampling were evaluated with respect to oxygen, methane, hydrogen sulfide, carbon monoxide and lower explosive limit.

4.1 Groundwater Quality Evaluation

The evaluation of CSA groundwater data is presented in this subsection. The purpose of the evaluation is to assess groundwater quality at and in the vicinity of the Landfill for impacts attributable to Landfill related operations and any trends in water quality, when results are compared to historical data. In its June 18, 2013 report, *Summary of Groundwater Assessment Findings* (see Appendix H - Reference Documents on Compact Disc of the ISA/CSA-SOW) Haley & Aldrich tabulated historical analytical results for soils, groundwater, an on site residential well, and sediment samples taken in the vicinity of the Landfill. These tables are included herein as Appendix F of this document and are referenced in the following discussions.

This CSA Interim Report evaluation focuses on the analytical results of the first of four CSA sampling events of the groundwater monitoring well system. This sampling event was conducted between September 11th and 22nd, 2014. Sampling and analysis was conducted, as described in Section 2.0, above.

Laboratory analysis reports are included in Appendix D. The tabulation of the analytical data compared to Massachusetts Primary and Secondary Drinking Water Standards, Drinkwater Water Standard Guidelines and the Massachusetts Contingency Plan (MCP) Method 1 GW-1, GW-2 and GW-3 Risk Based Standards are included in Table 3.

4.1.1 Upgradient Groundwater Quality

Background and/or upgradient groundwater quality in the vicinity of the Landfill is determined by analysis of samples taken at monitoring well cluster SGA-01 (SGA-01S, SGA-01D, SGA-01B). This well cluster location is hydraulically (with respect to groundwater flow) upgradient from the Landfill and adjacent to the stream that flow at the perimeter of the landfill.

SGA-01 Series Wells

Previous sampling of SGA-01S and SGA-01D, as indicated on the Haley &Aldrich tables included in Appendix F, was conducted by St. Germain in 2002, EPA (Weston Solutions) in 2004 and Haley & Aldrich in 2013. The St. Germain and EPA results were compared to MCP Method 1, GW-1 and GW-3 standards and showed no exceedances of those standards, other than an estimated quantification of chromium in SGA-01D. Haley & Aldrich's 2013 sampling results were also compared to the MCP Method 1 standards as well as Drinking Water Standards. Other than iron (SGA-01S) and manganese (SGA-01D) exceeding secondary drinking water standards there were no other exceedances of standards at this location.

SITEC's 2014 sampling results for SGA-01S, SGA-01D, and the new bedrock well SGA-01B, are similar to the historic results. Elevated levels of iron and manganese, which exceed Secondary Drinking Water Standards were noted in the sample results. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, nitrate, and COD were reported at this well cluster. Sodium was detected at a concentration of 23,000 ug/l which is just above its Drinking Water Guideline of 20,000 ug/l.

One Semi-Volatile Organic Compound (SVOC) was detected at this monitoring well cluster in all three wells, shallow overburden, deep overburden and bedrock. At SGA-01S, Bis(2-Ethylhexyl)phthalate was detected at 7.5 ug/l which exceeds its MCP GW-1 standard of 6.0 ug/l. The concentrations reported at the deep overburden well, SGA-01D, and bedrock well, SGA-01B, did not exceed this standard.

No Volatile Organic Compounds (VOCs) were detected in the samples from this well cluster.

4.1.2 Downgradient Groundwater Quality

Downgradient groundwater quality in the vicinity of the Landfill is represented by analysis of samples collected at monitoring wells (HA-1, HA-1D),(HA-1B, HA-2, HA-2D), (HA-2B, HA-3), HA-6, SGA-03 and MW-5. These well locations are hydraulically downgradient from the Landfill.

HA-1 Series Wells

Previous sampling of well HA-1 was conducted by Haley & Aldrich in 2013 and was limited to the single shallow overburden well. Haley & Aldrich's 2013 sampling results were compared to the MCP Method 1, GW-1 and GW-3 standards as well as Drinking Water Standards. Other than Secondary Drinking Water Standards, there were no other exceedances of standards reported by Haley & Aldrich at this location.

SITEC's 2014 sampling results for well HA-1, the new deep overburden well HA-1D, and the new bedrock well HA-1B, are similar to the historic results with respect to the concentrations of Iron in HA-1B and Manganese in all three wells. Also, a Secondary Drinking Water Standard exceedance of Total Dissolved Solids (TDS) was also reported at HA-1only. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, nitrate, and COD were reported at this well cluster.

No Volatile Organic Compounds (VOCs) were detected in the samples from this well cluster. One Semi-volatile organic compound, Bis(2-Ethylhexyl)phthalate, was detected within the deep overburden well, HA-1D, at a concentration of 13 ug/l, exceeding its GW-1 standard of 6 ug/l. This is the same SVOC as was detected within each of the SGA-01 series wells.

HA-2 Series Wells

Previous sampling of HA-2 was conducted by Haley & Aldrich in 2013 and was limited to the single shallow overburden well. Haley & Aldrich's 2013 sampling results were compared to the MCP Method 1, GW-1 and GW-3 standards as well as Drinking Water Standards. Other than Secondary Drinking Water Standards there were no other exceedances of standards reported by Haley & Aldrich at this location. There were two VOCs detected at concentrations well below their respective MCP standards.

SITEC's 2014 sampling results for HA-2, the new deep overburden well HA-2D, and the new bedrock well HA-2B, are similar to the historic results in that Secondary Drinking Water Standards were exceeded pH, Total Dissolved Solids (TDS), Iron and Manganese. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, nitrate, and COD were reported at this well cluster.

Also, Sodium was detected at a concentration of 24,000 ug/l exceeding its Drinking Water Standard Guideline of 20,000 ug/l and the SVOC, Bis(2-Ethylhexyl)phthalate was detected in the deep overburden well but at a concentration below its MCP GW-1 standard. There were no VOCs detected in samples from this well cluster.

HA-3

Previous sampling of HA-3, as indicated was conducted by Haley & Aldrich in 2013 and was limited to the single shallow overburden well. Haley & Aldrich's 2013 sampling results were compared to the MCP Method 1, GW-1 and GW-3 standards as well as drinking water standards. Other than Secondary Drinking Water Standards, there were no other exceedances of standards reported by Haley & Aldrich at this location.

SITEC's 2014 sampling results for HA-3, are similar to the historic results in that only the concentration of Iron exceeded its SDWS. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, nitrate, and COD were reported at this well cluster. There were no VOCs or SVOCs detected at this location.

HA-6

Previous sampling of HA-6 was conducted by Haley & Aldrich in 2013 and was limited to the single shallow overburden well. Haley & Aldrich's 2013 sampling results were compared to the MCP Method 1, GW-1 and GW-3 standards as well as drinking water standards. Other than secondary drinking water standards, there were no other exceedances of standards reported by Haley & Aldrich at this location.

SITEC's 2014 sampling results for HA-6, are similar to the historic results in that only Secondary Drinking Water Standard exceedances were reported. These exceedances include an elevated pH along with Iron and Manganese. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, and COD were reported at this well cluster. There were no VOCs or SVOCs detected at this location.

SGA-03

Previous sampling of SGA-03 was conducted by St. Germain in 2002, EPA (Weston Solutions) in 2004 and Haley & Aldrich in 2013. The St. Germain and EPA results were compared to MCP Method 1, GW-1 and GW-3 results and showed no exceedances of those standards. Haley & Aldrich's 2013 sampling results were also compared to the MCP Method 1 standards as well as drinking water standards. Other than manganese exceeding its secondary drinking water standard, there were no other exceedances of standards at this location.

SITEC's 2014 sampling results for SGA-03 are similar to the historic results as only Manganese exceeded its Secondary Drinking Water Standard. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, and COD were reported at this well. There were no VOCs or SVOCs detected at this location.

MW-5

Previous sampling of MW-5 was conducted by Haley & Aldrich in 2013. Haley & Aldrich's 2013 sampling results were compared to the MCP Method 1, GW-1 and GW-3 standards as well as drinking water standards. Other than a secondary drinking water standard exceedance for manganese, there were no other exceedances of standards reported by Haley & Aldrich at this location.

SITEC's 2014 sampling results for MW-5 are similar to the historic results in that only secondary drinking water exceedances were observed. The exceedances include a slightly depressed pH and an elevated concentration of manganese. Cyanide was reported exceeding its MCP Method 1, GW-3 standard at MW-5. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, nitrate, and COD were reported at this well.

There were no VOCs detected at this location however, the SVOC, Bis(2-Ethylhexyl)phthalate, was detected but at a concentration below its GW-1 Standard. This is the same SVOC that had been detected at other monitoring locations during this sampling event.

4.1.3 Crossgradient Groundwater Quality

Crossgradiant groundwater quality to the south of the Landfill is determined by analysis of samples taken at monitoring well cluster MW-03 (MW-03, MW-03B). This well cluster location is hydraulically (with respect to groundwater flow) crossgradient from the Landfill in uplands to the south of the Landfill.

MW-03 Series Wells

Previous sampling of was conducted by EPA (Weston Solutions) in 2004. The EPA results were compared to MCP Method 1, GW-1 and GW-3 results and showed an exceedance of berylium to its GW-1 standard. There were no other exceedances of standards at this location.

SITEC's 2014 sampling results for MW-03, and the new bedrock well MW-03B, revealed elevated levels of iron and manganese, which exceed secondary drinking water standards. pH values in each well also exceeded their secondary standard with MW-03 being slightly depressed and MW-03B being elevated. Sodium was detected at MW-03B at a concentration of 38,000 ug/l which exceeded its ORS Guideline of 20,000 ug/l. In addition, consistent with historic results elevated concentrations of alkalinity, sulfate, and COD were reported at this well.

There were no VOCs detected at these locations however, the SVOC, Bis(2-Ethylhexyl)phthalate, was detected at MW-03B but at a concentration below its GW-1 Standard. This is the same SVOC that had been detected at other monitoring locations during this sampling event.

4.1.4 Conclusions on Groundwater Quality

Based upon the results of a single sampling event of the groundwater monitoring wells in the vicinity of the Landfill, there is a detected impact to groundwater in the vicinity of the Landfill. Concentrations of iron and manganese that do not meet secondary groundwater drinking standards are present in the overburden, deep, and bedrock groundwater in the vicinity of the Landfill. Elevated Chemical Oxygen Demand (COD) and Total Dissolved Solids (TDS) indicate an impact to groundwater, with the highest COD concentration reported at HA-3 and the highest TDS concentration reported at HA-2, both located immediately downgradient of the Landfill. Cyanide was also reported in four downgradient wells and exceeded its MCP Method 1, GW-3 in downgradient monitoring well MW-5. Elevated sodium above its drinking water guideline was detected in all three bedrock wells. Bis(2-Ethylhexyl)phthalate was detected in seven groundwater samples and exceeded its MCP Method 1 GW-1 standards in three groundwater samples in the immediate vicinity and downgradinet from the landfill.

The elevated detections of iron, manganese, COD, TDS, and Bis(2-Ethylhexyl)phthalate is consistent for groundwater adjacent to a construction and demolition debris landfill; however, these identified impacts to groundwater are based on a single sampling event during low groundwater conditions. An additional three rounds of sampling with further hydro-geologic evaluations are planned as part of the CSA. This additional assessment will further characterize a source and risk to human health and the environment.

4.2 Private Residential Water Supply Well Quality

The evaluation of the analytical data from the samples collected at the two closest private residential wells is presented in this subsection. These residential wells are located at 460 Old Fall River Road and at 1 Stonefield Lane. Both residences are located to the north and are within 500 feet of the Landfill. The samples collected from these residences are identified as PW-265 and PW-266 on the laboratory data reports and on Table 6. The laboratory data reports are included in Appendix E.

The results are tabulated on Table 6 along with the Massachusetts Primary and Secondary Drinking Water Standards, Guidelines and MCP GW-1 Standards. There were no exceedances of Primary or Secondary Drinking Water Standards, Guidelines or MCP GW-1 Standards in either well sample. Therefore, we conclude that there has been no Landfill related impact to these private drinking water supply wells.

4.3 Surface Water Quality

The evaluation of CSA surface water data is presented in this subsection. The purpose of the evaluation is to assess surface water quality at and in the vicinity of the Landfill, for impacts attributable to the Landfill and any trends in surface water quality, when results are compared to historical data. In its January 28, 2005 report, *Final Expanded Site Inspection Report, Cole Brook Pines Landfill*, (see Appendix H - Reference Documents on Compact Disc of the ISA/CSA-SOW) Weston Solutions discussed and presented results of previous surface water and sediment sampling results conducted by Weston and others. An excerpted portion of the Weston report that discusses surface water and sediment sampling results is included herein as Appendix G.

Previous surface water sampling, as discussed in the referenced Weston report, was limited to two samples taken in 1977 by GHR, that reported low concentrations of copper and zinc. Weston also says that St. Germain collected five surface water samples in 2002, but no results are given.

This surface water evaluation is focused on analytical results obtained during the first CSA round of sampling of the surface water monitoring locations in September 2014. Sampling and analysis was conducted, as described in Section 2.0, above. Surface water sampling locations are shown on Figure 2, Environmental Monitoring Plan.

Laboratory data reports are included in Appendix D and a tabulation of the analytical data compared to Massachusetts Primary and Secondary Drinking Water Standards, ORS Guidelines and the National Recommended Water Quality Criteria are included in Table 4.

4.3.1 Up Gradient Surface Water Quality

SW-1

Surface Water location SW-1 is located in the unnamed stream, along the east side of the Landfill, north of the Algonquin gas line and in the vicinity of monitoring well cluster SGA-01. This location is considered upgradient and would most likely demonstrate background concentrations in the surface water. At the time of this first sampling round, there were no flowing or standing surface waters, so no sample could be taken. There had been little precipitation during the weeks prior to the sampling event.

4.3.2 Down Gradient Surface Water Quality

SW-2

Surface Water location SW-2 is located in the unnamed stream, at the northernmost extent of the Landfill , where a drainage channel that crosses under Old Fall River Road joins the unnamed stream that flows around the Landfill. This location is considered down gradient of the landfill. The concentration of manganese (dissolved) was reported at 77 ug/l which slightly exceeded its Secondary Drinking Water Standard of 50 ug/l. The elevated concentration of manganese in surface water and is likely naturally occurring condition. There were no VOCs detected in the surface water sample. The concentration of Sodium was reported at 24,000 ug/l which exceeds its ORS Guideline of 20,000 ug/l. There were no other exceedances reported to either Drinking Water Standards, ORS Guidelines or Recommended Water Quality Criteria.

SW-3

Surface Water location SW-3 is located in the unnamed stream, along the west side of the Landfill, north of the Algonquin gas line and south of the metal culvert that passes under a dirt foot path. This location is considered down gradient of the Landfill. With the exception of Iron and Manganese, there were no reported exceedances to Drinking Water Standard, Guidelines or Water Quality Criteria. Iron and Manganese are Secondary Drinking Water Standards and elevated concentrations in surface water and is likely naturally occurring condition. There were no VOCs detected in this surface water sample.

4.3.3 Conclusion on Surface Water Quality

Secondary Drinking Water Standards for Iron and Manganese were reported. These exceedances are common and naturally occurring within New England waters. Sodium exceeded its ORS Guideline at SW-2. This elevated concentration could be attributed to road salts or other sources. Based upon the results of this first CSA sampling event, it does not appear that surface water has been significantly impacted by the Landfill.

4.4 Sediment Quality Evaluation

The evaluation of CSA sediment data is presented in this subsection. The purpose of the evaluation is to assess surface water sediment quality at and in the vicinity of the Landfill, for impacts attributable to Landfill operations and any trends in sediment quality, when results are compared to historical data and MassDEP Sediment Screening Criteria. In its January 28, 2005 report, *Final Expanded Site Inspection Report, Cole Brook Pines Landfill*, (see Appendix H - Reference Documents on Compact Disc of the ISA/CSA-SOW) Weston Solutions discussed and presented results of previous surface water and sediment sampling results conducted by Weston and others. An excerpted portion of the Weston report that discusses surface water and sediment sampling results is included herein as Appendix G.

4.4.1 Historical Sediment Data

Previous sediment sampling, as discussed in the referenced Weston report, was conducted by the Town of Dartmouth Conservation Commission in 1982, Weston (START) in 2000, St. Germain in 2002, and Weston (START) in 2004. According to Weston, the following sediment sampling results have been reported.

- The Town of Dartmouth Conservation Commission took a single sediment sample and had it analyzed for PCBs. The reported results indicated the presence of a single PCB (arochlor) at 22 ppb.
- The Weston (START) 2000 results reported that in five sediment samples no VOCs or SVOC were reported above reference criteria (MCP Freshwater Sediment Screening Threshold Effect Concentration (TEC)) with some below reference criteria detections being reported. No pesticides, PCBs or cyanide were detected in any samples. Weston also reported that three metals (antimony, beryllium and cadmium) were reported above reference criteria, but that they did not consider their presence a result the Landfill.
- St. Germain collected five sediment samples and reported the presence of beryllium in two samples and six SVOCs in one sample, which are typical of asphalt or ash.
- The Weston (START) 2004 results reported that in 17 sediment samples no VOCs were reported above reference criteria with three VOC detections below their reference criteria being reported. One pesticide was detected at a single location, but was not considered to be attributable to the Landfill. No SVOCs were reported above their detection limit. Weston also reported that two metals (iron and manganese) were reported above reference criteria, and that their presence was considered to be a result of the Landfill.

Since there are no health based risk standards for sediments, sediment results are compared to Sediment Screening Criteria (Revised Sediment Screening Values, MassDEP, January 2006). The sediment samples were tested for total metals, Polychlorinated biphenyls (PCBs), pesticides and semi-volatile organic compounds (SVOCs). All sediment sample results are summarized in Table 5 and the analytical reports are included in Appendix B. The location of the sediment sampling locations are indicated on Figure 2, Environmental Monitoring Plan.

4.4.2 Up Gradient Sediment Quality

SD-1

Sediment location SD-1 is located in the unnamed stream, along the east side of the Landfill, north of the Algonquin gas line and in the vicinity of monitoring well cluster SGA-01. This location is considered upgradient and would most likely demonstrate background concentrations in the sediments. The following metals were detected within this sediment sample: Barium, Calcium, Chromium, Copper, Iron, Lead, Manganese, Mercury and Zinc. The concentrations at which these metals reported are below the applicable Sediment Screening Criteria with the exception of the anomalous detection of Mercury, reported at 0.323 mg/kg, which is slightly above its 0.18 mg/kg Screening Criteria.

Though the MCP Risk Characterization Standards for Soil do not apply to sediments, a comparative presentation of the data against these standards is also included on Table 5. The concentration of Mercury reported in this sample did not exceed the MCP Standard of 20 mg/kg.

This sediment sample was also analyzed for the presence of Pesticides, PCBs and Semi Volatile Organic Compounds (SVOCs), none of which were detected.

4.4.3 Down Gradient Sediment Quality

SD-2

Sediment location SD-2 is located in the unnamed stream, at the northern extent of the Landfill , where a drainage channel that crosses under Old Fall River Road joins the unnamed stream that flows around the Landfill. This location is considered down gradient of the Landfill and would most likely demonstrate impacts, if present, that could possibly be attributed to the Landfill. Consistent with upgradient sample SD-1, the following metals were detected: Barium, Calcium, Chromium, Copper, Iron, Lead, Manganese and Zinc. The concentrations at which these metals reported are all below the applicable Sediment Screening Criteria and are actually lower than the upgradient SD-1. It is noted that Mercury was not detected in this sample nor were there Pesticides, PCBs or SVOCs detected.

SD-3

Sediment location SD-3 is located in the unnamed stream, along the west side of the Landfill, north of the Algonquin gas line and south of the metal culvert under a dirt foot path. This location is considered down gradient and would most likely demonstrate impacts attributed to the Landfill. Consistent with upgradient sample SD-1, and downgradient sample SD-2, the following metals were detected: Barium, Calcium, Chromium, Copper, Iron, Lead, Manganese and Zinc. The concentrations at which these metals reported are all below the applicable Sediment Screening Criteria. With the exception of Iron and Manganese, the metals concentrations are lower than those reported at SD-1 and SD-2. Again, it is noted the Mercury was not detected in this sample nor were there Pesticides, PCBs or SVOCs detected.

4.4.4 Conclusion on Sediment Quality Evaluation

Based upon the results of the sampling event of the sediments collected from the stream, it does not appear that surface water sediments have been impacted by the Landfill. With the exception of an anomalous detection of Mercury at the upgradient SD-1 sample location, there were no total metals, PCBs, pesticides or SVOCs detected above the Sediment Screening Criteria or MCP Standards in any of the three sediment samples that were submitted for laboratory analysis.

The results of this testing is consistent with the testing that has been done previously by Weston, St. Germain and the Town of Dartmouth in that there were no impacts that could be directly attributed to the Landfill.

4.5 Soil Quality Evaluation

The purpose of the evaluation was to assess soil quality for impact that may be attributable to Landfill related operations. The evaluation focused on analytical results of soil samples collected during the installation of monitoring wells in September 2014. Sampling and analysis was conducted, as described in Section 2.0. Laboratory analysis reports are included in Appendix B. The analytical data is compared to Massachusetts Contingency Plan (MCP) Risk Based Standards and are presented on Table 8.

Three (3) soil samples were collected as part of this assessment from three (3) different well locations. Soil samples were collected from monitoring well HA-1B at an interval of 0 to 2 feet below ground surface (bgs). A sample was collected at well HA-2B at an interval of 4 to 6 feet bgs and at MW-3B from 0 to 2 feet bgs. All soil samples submitted for laboratory analysis exhibited the highest headspace reading from the particular boring. Monitoring wells HA-1B and HA-2B are considered hydrologically downgradient of the landfill while MW-3B is situated cross-gradient of the landfill. Please refer to Figure 2, Environmental Monitoring Plan.

Soil samples collected from each location were analyzed for dissolved metals (14), cyanide (total) and Volatile Organic Compounds (VOCs). These results were compared to MCP S-1, S-2 and S-3 standards. Though dissolved metals were detected in each soil sample, their concentrations did not exceed the MCP Risk Based Standards. Also, there were no VOCs detected in the three samples analyzed .

4.5.1 Conclusion on Soil Quality

Based upon the results soil sampling conduced during the installation of the groundwater monitoring wells it appears that soils located both cross-gradient and down gradient of theLlandfill have not been impacted by historic Landfill operations.

4.6 Landfill Gas Evaluation

As part of this CSA, landfill gas probes were installed and screened for the presence of landfill gas, to evaluate any migration of landfill gas through the sub-surface soils around the Landfill.

4.6.1 Landfill Gas Probes

The five perimeter landfill gas probes were screened on September 24, 2014 by SITEC. The probes were screened for % Lower Explosive Limit (%LEL), percent by volume of oxygen (%O_2), percent by volume of methane (%CH_4), hydrogen sulfide (H_2S) in ppm and percent by volume of carbon monoxide (%CO). The probes were also screened for Volatile Organic Compounds (VOCs) using a PID.

Results of this landfill gas screening event are presented on Table 7. As noted, the landfill gas screening conducted to date has not indicated the presence of landfill gas. Based upon these results, it does not appear that concentrations of landfill gas have migrated via the sub-surface soils out beyond the perimeter of the Landfill.

5.0 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations reached as a result of initial field investigations, evaluations, and analysis are presented in this sub-section.

5.1 Overview

An environmental monitoring network has been developed at the Landfill and has been used to collect environmental data in the vicinity of the Landfill. The field activities for this initial round consisted of the installation of six additional monitoring wells in the deep overburden and in bedrock aquifers, three surface water and sediment sampling locations, and five landfill gas probes, collecting groundwater samples from 15 monitoring wells, surface water and sediment samples from three locations, sampling two residential wells and gas screening five landfill gas probes.

5.2 Conclusions

1. Based upon the results of the initial sampling event of the groundwater monitoring wells in the vicinity of the Landfill, groundwater has been impacted by the Landfill. The elevated detections of iron, manganese, COD, TDS, and Bis(2-Ethylhexyl)phthalate in the shallow, deep, and bedrock groundwater is consistent for groundwater adjacent to a construction and demolition debris landfill. However, these impacts to groundwater are based on a single sampling event conducted in September during low groundwater conditions. An additional three rounds of sampling with further hydro-geologic evaluations are planned as part of the CSA. This additional assessment will further characterize a source and risk to human health and the environment, during varied seasonal groundwater conditions.

2. Based upon the results of the initial sampling event of the surface water, it does not appear that surface water has been impacted by the Landfill. Concentrations of iron and manganese that do not meet secondary groundwater drinking standards are common in groundwater and surface water throughout much of New England.

3. Except for a low detection of Mercury in upgradient sediment s sample SD-1, no Metals, PCBs, pesticides, or SVOCs, were detected above the Sediment Screening Criteria in any of the three sediment samples that were submitted for laboratory analysis. The single detection of mercury slight above its sediment screening criteria was reported upgradient and is likely not attributable to the Landfill.

4. Results of laboratory analysis of three soil samples for VOCs, dissolved metals and total cyanide did not exceed the values of the Massachusetts Contingency Plan (MCP) Method 1, S-1, S-2 or S-3 Risk Based Standards.

5. Landfill gas screening did not identify the presence of landfill gas in the five soil landfill probes that were installed as part of this assessment. It does not appear that landfill gas has migrated via the sub-surface soils. Therefore, the MassDEP regulatory standard for landfill gas migration of 25% LEL at the property boundary has not been exceeded.

5.3 Recommendations

1. It is recommended that BEC perform three remaining CSA groundwater and surface water monitoring events at the Landfill. It is also recommended that analysis of constituents be revised by eliminating the analysis for 1,4 Dioxane by EPA Method 2870 but continued by EPA Method 8260, which will provide a detection limit slightly above drinking water standards. The justification for the change is there were no concentrations of 1,4 Dioxane reported in the initial sampling event.

2. It is recommended that BEC perform three remaining landfill gas screening events for completion of the CSA. Additionally a landfill gas sample will be collected from the Landfill for analysis of VOCs by EPA Method TO-15, as required by the ISA/CSA-SOW approval.

3. No further sampling of sediments or residential wells are recommended. Results of the initial round of sampling these media did not detect contaminant concentration that indicate these media have been impacted by the Landfill. Continued groundwater monitoring will indicate if other residential wells may be at risk from the Landfill, which would initiate possible installation of additional monitoring wells or sampling other residential wells.

4. No additional surface water sampling locations are recommended. Surface water sampling results to date indicate that surface waters have not been significantly impacted by the Landfill. Continued monitoring will indicate if surface waters may be at risk from the Landfill, which would initiate possible inclusion of additional surface water monitoring locations in the future.

5. The results of surface water and sediment analysis indicate that there is no need for conducting an ecological risk assessment.

TABLES

TABLE 1

GROUNDWATER MONITORING WELL DATA

Well I.D.	Elevation of PVC Casing (ft)	Total Well Casing Depth (ft) *	Depth to Screen Intervals (ft) **	Screen Interval Elevations (ft) **	Latitude (D-M)	Longitude (D-M)	Comments
Haley & Aldrich - Geologic Earth Explorations, Inc - May 22 - 24, 2013							
HA-1	75.20	14.40	(9.00-15.00)	66.20 - 60.20	N 41° 40.668'	W 71° 00.818'	
HA-1D ***	75.80	37.36			N 41° 40.674'	W 71° 00.818'	Installed by SE - Sept. 2014
HA-1B ***	75.43	45.95			N 41° 40.675'	W 71° 00.818'	Installed by SE - Sept. 2014
HA-2	75.16	14.45	(9.00-15.00)	66.16 - 60.16	N 41° 40.735'	W 71° 00.751'	
HA-2D ***	74.23	56.72			N 41° 40.735'	W 71° 00.754'	Installed by SE - Sept. 2014
HA-2B ***	74.55	72.21			N 41° 40.735'	W 71° 00.756'	Installed by SE - Sept. 2014
HA-3	84.20	17.91	(10.00-18.00)	74.20 - 66.20	N 41° 40.594'	W 71° 00.667'	
HA-4	81.90	13.10	(9.10-13.10)	72.80 - 68.80	N 41° 40.726'	W 71° 00.568'	
HA-5	77.32	12.80	(9.00-15.00)	68.32 - 62.32	N 41° 40.745'	W 71° 00.650'	
HA-6	76.78	12.00	(9.10-13.10)	67.68 - 63.68	N 41° 40.800'	W 71° 00.703'	
Weston Solutions, Inc. (START Program) - Environmental Drillers, Inc. - January 26 - April 13, 2004							
MW-01			(6.00 - 16.00)		N 41° 40.402'	W 71° 00.52367'	Not Located
MW-02			(6.00 - 16.00)		N 41° 40.438'	W 71° 00.68483'	Not Located
MW-03		15.70	(6.00 - 16.00)		N 41° 40.4825'	W 71° 00.738167'	
MW-03B ***		33.52			N 41° 40.4745'	W 71° 00.746'	Installed by SE - Sept. 2014
MW-04	82.02	Not determined	(6.00 - 16.00)	76.02 - 66.02	N 41° 40.667'	W 71° 00.6515'	Well damaged
MW-05	74.91	15.71	(6.00 - 16.00)	68.91 - 58.91	N 41° 40.631'	W 71° 00.8965'	
MW-06	87.41	14.86	(5.00 - 15.00)	82.41 - 72.41	N 41° 40.4275'	W 71° 00.3935'	
MW-07	93.34	17.73	(8.00 - 18.00)	85.34 - 75.34	N 41° 40.297'	W 71° 00.503'	
St. Germain & Associates, Inc. - Guild Drilling Company, Inc. - February 19 - 25, 2002							
SGA-01S	84.20	14.22	(5.00 - 15.00)	79.20 - 69.20	N 41° 40.599'	W 71° 00.5545'	Originally MW-1S
SGA-01D	84.24	52.66	(44.00 - 54.00)	40.24 - 30.24	N 41° 40.5992'	W 71° 00.55367'	Originally MW-1D
SGA-01B ***		61.28			N 41° 40.599'	W 71° 00.551'	Installed by SE - Sept. 2014
SGA-02		14.93	(6.00 - 16.00)		N 41° 40.4885'	W 71° 00.60933'	Originally MW-2
SGA-03	74.20	20.93	(11.00 - 21.00)	63.20- 53.20	N 41° 40.607'	W 71° 00.783'	Originally MW-3
SGA-04	75.17	21.16	(12.00 - 22.00)	63.17 - 53.17	N 41° 4042533'	W 71° 00.7495'	Originally MW-4
SGA-05S			(2.50 - 11.00)		N 41° 40.75033'	W 71° 00.65967'	Originally MW-5S - Not Located
SGA-05D			(32.00 - 42.00)		N 41° 40.74917'	W 71° 00.65683'	Originally MW-5D - Not Located
SGA-06S			(2.00 - 12.00)				Originally MW-6S - Not Located
SGA-06D			(54.00 - 44.00)				Originally MW-6D - Not Located

* Based Upon Field Measurements (SITEC - September 2014)

** Based on Well Construction Logs

*** Installed Under SITEC's Supervision - September 2014

TABLE 2

GROUNDWATER AND SURFACE WATER ELEVATION DATA

Well I.D.	Elevation of PVC Casing (ft)	SEPTEMBER 2014	
		Depth to Water	Water Elevation
GROUNDWATER			
HA-1	75.20	6.83	68.37
HA-1D	75.80	7.43	68.37
HA-1B	75.43	7.15	68.28
HA-2	75.16	6.03	69.13
HA-2D	74.23	5.08	69.15
HA-2B	74.55	5.45	69.10
HA-3	84.20	12.06	72.14
HA-4	81.90	8.19	73.71
HA-5	77.32	6.22	71.10
HA-6	76.78	7.33	69.45
MW-03	80.20	9.63	70.57
MW-03B	79.89	9.91	69.98
MW-04	82.02	DAMAGED	NA
MW-05	74.91	7.11	67.80
MW-06	87.41	7.37	80.04
MW-07	93.34	13.03	80.31
SGA-01S	84.20	6.80	77.40
SGA-01D	84.24	7.76	76.48
SGA-01B	84.04	--	--
SGA-02	84.06	9.51	74.55
SGA-03	76.38	7.85	68.53
SGA-04	75.17	6.03	69.14
SURFACE WATER			
SW-1	81.06	DRY	NA
SW-2	71.26	1.47	69.79
SW-3	69.38	0.99	68.39

TABLE 3-1
GROUNDWATER VOLATILE ORGANIC COMPOUND (VOC) ANALYSIS SUMMARY

COMPOUND	Risk Characterization Standards (ug/l)				RESULTS (ug/l)													
					SGA-01S	**SGA-01D**	**SGA-01B**	**HA-1**	**HA-1D**	**HA-1B**	**HA-2**	**HA-2D**	**HA-2B**	**HA-3**	**HA-6**	**MW-5**	**SGA-03**	**MW-03**	**MW-3B**
	DWS	GW-1	GW-2	GW-3	9/17/14	9/17/14	9/22/14	9/17/14	9/17/14	9/17/14	9/11/14	9/12/14	9/12/14	9/15/14	9/11/14	9/15/14	9/15/14	9/15/14	9/17/14
1,1,1,2-Tetrachloroethane	NS	5	10	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	200	200	4000	20000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	NS	2	9	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	5	5	900	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	70 (G)	70	2000	20000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	7	7	80	30000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloropropene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2,3-Trichlorobenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2,3-Trichloropropane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2,4-Trichlorobenzene	70	70	200	50000	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2,4-Trimethylbenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2-Dibromo-3-chloropropane	0.2	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2-Dibromoethane	NS	0.02	2	50000	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	600	600	8000	2000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	5	5	5	20000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	NS	NS	NS	NS	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	5	5	3	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,3-Dichlorobenzene	NS	100	6000	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichloropropane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,3-Dichloropropene, Total	NS	0.4	10	200	0.5 U	0.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	5	5	60	8000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dioxane *	0.3 (G)	0.3	6000	50000	0.144 U	0.144 U	0.144 U	0.144 U	0.15 U	0.144 U	0.144 U	0.15 U	0.144 U	0.144 U	0.144 U	0.144 U	0.144 U	0.144 U	0.144 U
2,2-Dichloropropane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2-Butanone (MEK)	4000 (G)	4000	50000	50000	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone (MBK)	NS	NS	NS	NS	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	NS	350	50000	50000	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	6300 (G)	6300	50000	50000	5 U	5 U	25 U	5 U	**33**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**5.2**
Benzene	5	5	1000	10000	0.5 U	0.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bromochloromethane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bromodichloromethane	NS	3	6	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	NS	4	700	50000	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bromomethane	10	10	7	800	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Carbon disulfide	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Carbon tetrachloride	5	5	2	5000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	100	200	1000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chloroform	70	70	50	20000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	70	70	20	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	NS	0.4	10	200	0.5 U	0.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	NS	2	20	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromomethane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dichlorodifluoromethane	1400 (G)	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethyl ether	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethyl-Tert-Butyl-Ether	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	700	700	20000	5000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorobutadiene	NS	0.6	50	3000	0.6 U	0.6 U	3 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Isopropyl Ether	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Isopropylbenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methyl tert butyl ether	70 (G)	70	50000	50000	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	NS	5	2000	50000	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
n-Butylbenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
n-Propylbenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Naphthalene	140 (G)	140	700	20000	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Chlorotoluene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Xylene	10000	10000	3000	5000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
p-Chlorotoluene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
p-Isopropyltoluene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
p/m-Xylene	10000	10000	3000	5000	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
sec-Butylbenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Styrene	100	100	100	6000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
tert-Butylbenzene	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tertiary-Amyl Methyl Ether	90 (G)	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene	5	5	50	30000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.5**
Tetrahydrofuran	600	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Toluene	1000	1000	50000	40000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	100	80	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	NS	0.4	10	200	0.5 U	0.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	5	5	5	5000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	NS	NS	NS	NS	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vinyl chloride	2	2	2	50000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	10000	10000	3000	5000	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

DWS = Massachusetts Drinking Water Standard or Guideline
(G) = Massachusetts Drinking Water Guideline
U = Analyzed but not found; detection limit listed
* = 1,4-Dioxane repoted by Method 8270-SIM
NS = No Standard for Indicated Parameter
= Red shade Indicates an exceedances of DWS or MCP GW-1 Method 1 Standard
= Blue Hatching Indicates an exceedances of MCP GW-2 Method 1 Standard
7390 = Green Text Indicates an exceedances of MCP GW-3 Method 1 Standard

TABLE 3-2
GROUNDWATER SEMI-VOLATILE ORGANIC COMPOUND (SVOC) ANALYSIS SUMMARY

COMPOUND	Risk Characterization Standards (ug/l)				RESULTS (ug/l)													
					SGA-01S	**SGA-01D**	**SGA-01B**	**HA-1**	**HA-1D**	**HA-1B**	**HA-2**	**HA-2D**	**HA-2B**	**HA-3**	**HA-6**	**MW-5**	**SGA-03**	**MW-03**	**MW-3B**
	DWS	GW-1	GW-2	GW-3	9/17/14	9/17/14	9/22/14	9/17/14	9/17/14	9/17/14	9/11/14	9/12/14	9/12/14	9/15/14	9/11/14	9/15/14	9/15/14	9/15/14	9/17/14
1,2,4-Trichlorobenzene	NS	70	200	50000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichlorobenzene	NS	600	8000	2000	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,3-Dichlorobenzene	NS	100	6000	50000	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,4-Dichlorobenzene	NS	5	60	8000	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4,5-Trichlorophenol	NS	200	50000	3000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4,6-Trichlorophenol	NS	10	5000	500	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4-Dichlorophenol	NS	10	30000	2000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4-Dimethylphenol	NS	60	40000	50000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4-Dinitrophenol	NS	200	50000	20000	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
2,4-Dinitrotoluene	NS	30	20000	50000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,6-Dinitrotoluene	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Chlorophenol	NS	10	20000	7000	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2-Methylphenol	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Nitrophenol	NS	NS	NS	NS	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	NS	80	NS	2000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
3-Methylphenol/4-Methylphenol	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Bromophenyl phenyl ether	NS	NS	NS	NS	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4-Chloroaniline	NS	20	30000	300	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Nitrophenol	NS	NS	NS	NS	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetophenone	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Aniline	NS	NS	NS	NS	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Azobenzene	NS	NS	NS	NS	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bis(2-chloroethoxy)methane	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Bis(2-chloroethyl)ether	NS	30	30	50000	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bis(2-chloroisopropyl)ether	NS	30	100	50000	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bis(2-Ethylhexyl)phthalate	NS	6	NS	50000	**7.5**	**4.4**	**4.1**	3 U	**13**	3 U	3 U	**3.4**	3 U	3 U	3 U	**3.2**	3 U	3 U	**6**
Butyl benzyl phthalate	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Di-n-butylphthalate	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Di-n-octylphthalate	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Dibenzofuran	NS	NS	NS	NS	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Diethyl phthalate	NS	2000	50000	9000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Dimethyl phthalate	NS	300	50000	50000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Isophorone	NS	NS	NS	NS	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Nitrobenzene	NS	NS	NS	NS	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Phenol	NS	1000	50000	2000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2 U	5 U	2 U	2 U	2 U	5 U
2-Chloronaphthalene	NS	NS	NS	NS	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
2-Methylnaphthalene	NS	10	2000	20000	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Acenaphthene	NS	20	NS	10000	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Acenaphthylene	NS	30	10000	40	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Anthracene	NS	60	NS	30	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Benzo(a)anthracene	NS	1	NS	1000	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Benzo(a)pyrene	0.2	0.2	NS	500	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Benzo(b)fluoranthene	NS	1	NS	400	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Benzo(ghi)perylene	NS	50	NS	20	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Benzo(k)fluoranthene	NS	1	NS	100	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Chrysene	NS	2	NS	70	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Dibenzo(a,h)anthracene	NS	0.5	NS	40	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Fluoranthene	NS	90	NS	200	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Fluorene	NS	30	NS	40	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Hexachlorobenzene	NS	1	1	6000	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	2 U	0.8 U	2 U	2 U	2 U	0.8 U
Hexachlorobutadiene	NS	0.6	50	3000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	2 U	2 U	2 U	0.5 U
Hexachloroethane	NS	8	100	50000	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	2 U	0.8 U	2 U	2 U	2 U	0.8 U
Indeno(1,2,3-cd)Pyrene	NS	0.5	NS	100	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Naphthalene	140 (G)	140	700	20000	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Pentachlorophenol	1	1	NS	200	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	10 U	0.8 U	10 U	10 U	10 U	0.8 U
Phenanthrene	NS	40	NS	10000	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U
Pyrene	NS	60	NS	20	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2 U	0.2 U	2 U	2 U	2 U	0.2 U

DWS = Massachusetts Drinking Water Standard or Guideline
(G) = Massachusetts Drinking Water Guideline
U = Analyzed but not found; detection limit listed
NS = No Standard for Indicated Parameter
= Red shade Indicates an exceedances of DWS or MCP GW-1 Method 1 Standard
= Blue Hatching Indicates an exceedances of MCP GW-2 Method 1 Standard
7390 = Green Text Indicates an exceedances of MCP GW-3 Method 1 Standard

TABLE 3-3
GROUNDWATER INORGANIC ANALYSIS SUMMARY

PARAMETER	Risk Characterization Standards (ug/l)				RESULTS (ug/l)														
	DWS	GW-1	GW-2	GW-3	SGA-01S 9/17/14	SGA-01D 9/17/14	SGA-01B 9/22/14	HA-1 9/17/14	HA-1D 9/17/14	HA-1B 9/17/14	HA-2 9/11/14	HA-2D 9/12/14	HA-2B 9/12/14	HA-3 9/15/14	HA-6 9/11/14	MW-5 9/15/14	SGA-03 9/15/14	MW-03 9/15/14	MW-3B 9/17/14
FIELD PARAMETERS																			
pH (pH units)	6.5-8.5 (S)	NS	NS	NS	6.8	7.2	8.4	7.6	7.8	8.4	6.9	7.0	**9.0**	7.2	**6.4**	**5.5**	7.2	**5.4**	**9.5**
Specific Conductance (mS/cm)	NS	NS	NS	NS	92	234	224	968	295	243	920	254	159	560	235	49	448	130	206
Temperature (^{o}C)	NS	NS	NS	NS	13.8	11.3	18.9	13.1	13.2	14.3	12.3	16.8	13.5	13.7	14.9	14.1	13.6	14.1	13.6
Dissloved Oxygen (mg/l)	NS	NS	NS	NS	4.61	8.52	7.02	2.11	5.16	1.46	0.00	1.34	2.17	0.11	8.49	0.41	0.81	0.62	5.76
GENERAL CHEMISTRY																			
Alkalinity (mg/l of $CaCO^{3}$)	NS	NS	NS	NS	**8.1**	**53.7**	**51.8**	**384**	**61.7**	**98.3**	**392**	**58.6**	**47.5**	**187**	**147**	**4.3**	**180**	2 U	**49.1**
Total Dissloved Solids	500000 (S)	NS	NS	NS	**89000**	**140000**	**350000**	**650000**	**190000**	**190000**	**610000**	**170000**	**150000**	**250000**	**260000**	10000 U	**280000**	**80000**	**190000**
Cyanide, Total	200	200	NS	30	5 U	5 U	5 U	**5**	5 U	5 U	5 U	**6**	5 U	**7**	5 U	**42**	5 U	5 U	5 U
Chloride	250000 (S)	NS	NS	NS	**15000**	**15000**	**28000**	**34000**	**28000**	**21000**	**32000**	**19000**	**8400**	**23000**	**8700**	**6800**	**16000**	**5500**	**26000**
Nitrogen, Nitrate	10000	NS	NS	NS	100 U	**3950**	**1570**	**1860**	**1330**	**605**	**195**	**5920**	**130**	**5750**	100 U	100 U	100 U	100 U	**1640**
Sulfate	250000 (S)	NS	NS	NS	**13000**	**20000**	**20000**	**120000**	**16000**	**17000**	**89000**	**20000**	**16000**	**38000**	**30000**	10000 U	**40000**	**33000**	**46000**
Chemical Oxygen Demand	NS	NS	NS	NS	**140000**	20000 U	**440000**	**71000**	**180000**	**29000**	**140000**	**22000**	**32000**	**1200000**	**62000**	**41000**	**130000**	**64000**	**62000**
DISSOLVED METALS																			
Arsenic	10	10	NS	900	5 U	5 U	5 U	5 U	5 U	5 U	**7**	**7**	**8**	5 U	5 U	5 U	5 U	**7**	5 U
Barium	2000	2000	NS	50000	**10**	**73**	**209**	**88**	**36**	**40**	**165**	**32**	**93**	**48**	**47**	**33**	**34**	**38**	**44**
Cadmium	5	5	NS	4	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Calcium	NS	NS	NS	NS	**3600**	**17000**	**18000**	**160000**	**29000**	**18000**	**140000**	**21000**	**6900**	**76000**	**29000**	**1000**	**68000**	**6100**	**10000**
Chromium	100	100	NS	300	10 U	10 U	**10**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**10**	10 U
Copper	1300/1000(S)	NS	NS	NS	10 U	10 U	**39**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Iron	300 (S)	NS	NS	NS	**1200**	**150**	**15000**	**100**	**140**	**1300**	**290**	**90**	**2000**	**580**	**4700**	**50**	50 U	**6600**	**2400**
Lead	15	15	NS	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Manganese	50 (S)	NS	NS	NS	**186**	10 U	**342**	**227**	**457**	**529**	**9860**	**57**	**53**	**46**	**314**	**354**	**241**	**1680**	**89**
Mercury	2	2	NS	20	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Selenium	50	50	NS	100	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Silver	100 (S)	100	NS	7	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U
Sodium	20000 (G)	NS	NS	NS	**8200**	**13000**	**23000**	**18000**	**18000**	**16000**	**18000**	**12000**	**24000**	**18000**	**8000**	**4800**	**10000**	**4600**	**38000**
Zinc	5000	5000	NS	900	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	**54**	50 U	50 U	50 U	50 U

DWS = Massachusetts Drinking Water Standard
(S) = Secondary Drinking Water Standard
(G) = Massachusetts Drinking Water Guideline

U = Analyzed but not found; detection limit listed

NS = No Standard for Indicated Parameter

NA = Not Analyzed for Indicated Parameter

= Yellow shade Indicates an exceedances of Secondary Maximum Contaminant Levels (aesthetic properties)

= Red shade Indicates an exceedances of DWS or MCP GW-1 Method 1 Standard

= Blue Hatching Indicates an exceedances of MCP GW-3 Method 1 Standard

TABLE 4-1
SURFACE WATER VOLATILE ORGANIC COMPOUND (VOC) ANALYSIS SUMMARY

COMPOUND	DWS	National Recommended Water Quality Criteria (ug/l)		RESULTS (ug/l)	
				SW-2	SW-3
		CMC	CCC	9/11/14	9/15/14
1,1,1,2-Tetrachloroethane	NS	NS	NS	1 U	1 U
1,1,1-Trichloroethane	200	NS	NS	1 U	1 U
1,1,2,2-Tetrachloroethane	NS	NS	NS	1 U	1 U
1,1,2-Trichloroethane	5	NS	NS	1 U	1 U
1,1-Dichloroethane	70 (G)	NS	NS	1 U	1 U
1,1-Dichloroethene	7	NS	NS	1 U	1 U
1,1-Dichloropropene	NS	NS	NS	2 U	2 U
1,2,3-Trichlorobenzene	NS	NS	NS	2 U	2 U
1,2,3-Trichloropropane	NS	NS	NS	2 U	2 U
1,2,4-Trichlorobenzene	70	NS	NS	2 U	2 U
1,2,4-Trimethylbenzene	NS	NS	NS	2 U	2 U
1,2-Dibromo-3-chloropropane	0.2	NS	NS	2 U	2 U
1,2-Dibromoethane	NS	NS	NS	2 U	2 U
1,2-Dichlorobenzene	600	NS	NS	1 U	1 U
1,2-Dichloroethane	5	NS	NS	1 U	1 U
1,2-Dichloroethene (total)	NS	NS	NS	1 U	1 U
1,2-Dichloropropane	5	NS	NS	1 U	1 U
1,3,5-Trimethylbenzene	NS	NS	NS	2 U	2 U
1,3-Dichlorobenzene	NS	NS	NS	1 U	1 U
1,3-Dichloropropane	NS	NS	NS	2 U	2 U
1,3-Dichloropropene, Total	NS	NS	NS	0.5 U	0.5 U
1,4-Dichlorobenzene	5	NS	NS	1 U	1 U
1,4-Dioxane *	0.3 (G)	NS	NS	0.144 U	0.144 U
2,2-Dichloropropane	NS	NS	NS	2 U	2 U
2-Butanone (MEK)	4000 (G)	NS	NS	5 U	5 U
2-Hexanone (MBK)	NS	NS	NS	5 U	5 U
4-Methyl-2-pentanone	NS	NS	NS	5 U	5 U
Acetone	6300 (G)	NS	NS	5 U	5 U
Benzene	5	NS	NS	0.5 U	0.5 U
Bromobenzene	NS	NS	NS	2 U	2 U
Bromochloromethane	NS	NS	NS	2 U	2 U
Bromodichloromethane	NS	NS	NS	1 U	1 U
Bromoform	NS	NS	NS	2 U	2 U
Bromomethane	10	NS	NS	2 U	2 U
Carbon disulfide	NS	NS	NS	2 U	2 U
Carbon tetrachloride	5	NS	NS	1 U	1 U
Chlorobenzene	100	NS	NS	1 U	1 U
Chloroethane	NS	NS	NS	2 U	2 U
Chloroform	70	NS	NS	1 U	1 U
Chloromethane	NS	NS	NS	2 U	2 U
cis-1,2-Dichloroethene	70	NS	NS	1 U	1 U
cis-1,3-Dichloropropene	NS	NS	NS	0.5 U	0.5 U
Dibromochloromethane	NS	NS	NS	1 U	1 U
Dibromomethane	NS	NS	NS	2 U	2 U
Dichlorodifluoromethane	1400 (G)	NS	NS	2 U	2 U
Ethyl ether	NS	NS	NS	2 U	2 U
Ethyl-Tert-Butyl-Ether	NS	NS	NS	2 U	2 U
Ethylbenzene	700	NS	NS	1 U	1 U
Hexachlorobutadiene	NS	NS	NS	0.6 U	0.6 U
Isopropyl Ether	NS	NS	NS	2 U	2 U
Isopropylbenzene	NS	NS	NS	2 U	2 U
Methyl tert butyl ether	70 (G)	NS	NS	2 U	2 U
Methylene chloride	NS	NS	NS	2 U	2 U
n-Butylbenzene	NS	NS	NS	2 U	2 U
n-Propylbenzene	NS	NS	NS	2 U	2 U
Naphthalene	140 (G)	NS	NS	2 U	2 U
o-Chlorotoluene	NS	NS	NS	2 U	2 U
o-Xylene	10000	NS	NS	1 U	1 U
p-Chlorotoluene	NS	NS	NS	2 U	2 U
p-Isopropyltoluene	NS	NS	NS	2 U	2 U
p/m-Xylene	10000	NS	NS	2 U	2 U
sec-Butylbenzene	NS	NS	NS	2 U	2 U
Styrene	100	NS	NS	1 U	1 U
tert-Butylbenzene	NS	NS	NS	2 U	2 U
Tertiary-Amyl Methyl Ether	90 (G)	NS	NS	2 U	2 U
Tetrachloroethene	5	NS	NS	1 U	1 U
Tetrahydrofuran	600	NS	NS	2 U	2 U
Toluene	1000	NS	NS	1 U	1 U
trans-1,2-Dichloroethene	100	NS	NS	1 U	1 U
trans-1,3-Dichloropropene	NS	NS	NS	0.5 U	0.5 U
Trichloroethene	5	NS	NS	1 U	1 U
Trichlorofluoromethane	NS	NS	NS	2 U	2 U
Vinyl chloride	2	NS	NS	1 U	1 U
Xylene (Total)	10000	NS	NS	1 U	1 U

DWS = Massachusetts Drinking Water Standard or Guidelin
(G) = Massachusetts Drinking Water Guidelin
CMC = Criteria Maximum Concentration is an estimate of the highest concentration of a material in a surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect.
CCC = Criteria Continuous Concentration is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect
U = Analyzed but not found; detection limit listed
* = 1,4-Dioxane repoted by Method 8270-SIM
NS = No Standard for Indicated Parameter
= Red shade Indicates an exceedances of DWS or MCP GW-1 Method 1 Standar

TABLE 4-2
INORGANIC SURFACE WATER ANALYSIS SUMMARY

PARAMETER	DWS	National Recommended Water Quality Criteria (ug/l)		RESULTS (ug/l)	
				SW-2	**SW-3**
		CMC	CCC	9/11/14	9/15/14
FIELD PARAMETERS					
pH (pH units)	6.5-8.5 (S)	NS	6.5-9.0	7.5	8.7
Specific Conductance (mS/cm)	NS	NS	NS	224	211
Temperature (^{o}C)	NS	NS	NS	17.1	15.4
Dissloved Oxygen (mg/l)	NS	NS	NS	4.15	5.36
GENERAL CHEMISTRY					
Alkalinity (mg/l of $CaCO^{3}$)	NS	NS	20000	**33.9**	**37.5**
Total Dissloved Solids	500000 (S)	NS	NS	**120000**	**92000**
Cyanide, Total	200	22	5.2	5 U	5 U
Chloride	250000 (S)	860000	230000	**28000**	**28000**
Nitrogen, Nitrate	10000	NS	NS	**1790**	**1220**
Sulfate	250000 (S)	NS	NS	**12000**	**11000**
Chemical Oxygen Demand	NS	NS	NS	**75000**	20000 U
DISSOLVED METALS					
Arsenic	10	340	150	5 U	5 U
Barium	2000	NS	NS	**50**	**34**
Cadmium	5	2	0.25	4 U	4 U
Calcium	NS	NS	NS	**12000**	**12000**
Chromium	100	16 (1)	11 (1)	10 U	10 U
Copper	1300/1000(S)	NA	NA	10 U	10 U
Iron	300 (S)	NS	1000	**160**	**400**
Lead	15	65	2.5	10 U	10 U
Manganese	50 (S)	NS	NS	**77**	**64**
Mercury	2	NS	NS	0.2 U	0.2 U
Selenium	50	NS	5	10 U	10 U
Silver	100 (S)	3.2	NS	7 U	7 U
Sodium	20000 (G)	NS	NS	**24000**	**18000**
Zinc	5000	120	120	50 U	50 U

DWS = Massachusetts Drinking Water Standard
(S) = Secondary Drinking Water Standard
(G) = Massachusetts Drinking Water Guideline
CMC = Criteria Maximum Concentration is an estimate of the highest concentration of a material in a surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect.
CCC = Criteria Continuous Concentration is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect
U = Analyzed but not found; detection limit listed
NS = No Standard for Indicated Parameter
NA = Criteria Dependent on Hardness (unknown)

= Yellow shade Indicates an exceedances of Secondary Maximum Contaminant Levels (aesthetic properties)
= Red shade Indicates an exceedances of DWS
= Blue hatch Indicates an exceedances of CMC
7390 = Green Text Indicates an exceedances of CCC

TABLE 5-1
SEDIMENT SEMI-VOLATILE ORGANIC COMPOUND (SVOC) ANALYSIS SUMMARY

COMPOUND	Risk Characterization Standards (mg/kg)			Sediment Screening Criteria (mg/kg) *	RESULTS (mg/kg)		
	S-1/GW-1	S-1/GW-2	S-1/GW-3		**SD-1**	**SD-2**	**SD-3**
1,2,4-Trichlorobenzene	2	6	700	NS	0.74 U	0.41 U	0.23 U
1,2-Dichlorobenzene	9	100	300	NS	0.74 U	0.41 U	0.23 U
1,3-Dichlorobenzene	3	100	100	NS	0.74 U	0.41 U	0.23 U
1,4-Dichlorobenzene	0.7	1	80	NS	0.74 U	0.41 U	0.23 U
2,4,5-Trichlorophenol	4	1000	600	NS	0.74 U	0.41 U	0.23 U
2,4,6-Trichlorophenol	0.7	20	20	NS	0.44 U	0.25 U	0.14 U
2,4-Dichlorophenol	0.7	60	40	NS	0.67 U	0.37 U	0.21 U
2,4-Dimethylphenol	0.7	100	500	NS	0.74 U	0.41 U	0.23 U
2,4-Dinitrophenol	3	50	50	NS	3.6 U	2 U	1.1 U
2,4-Dinitrotoluene	0.7	2	2	NS	0.74 U	0.41 U	0.23 U
2,6-Dinitrotoluene	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
2-Chloronaphthalene	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
2-Chlorophenol	0.7	100	100	NS	0.74 U	0.41 U	0.23 U
2-Methylnaphthalene	0.7	80	300	NS	0.89 U	0.49 U	0.28 U
2-Methylphenol	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
2-Nitrophenol	NS	NS	NS	NS	1.6 U	0.89 U	0.5 U
3,3'-Dichlorobenzidine	3	3	3	NS	0.74 U	0.41 U	0.23 U
3-Methylphenol/4-Methylphenol	NS	NS	NS	NS	1.1 U	0.59 U	0.33 U
4-Bromophenyl phenyl ether	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
4-Chloroaniline	1	7	3	NS	0.74 U	0.41 U	0.23 U
4-Nitrophenol	NS	NS	NS	NS	1 U	0.58 U	0.32 U
Acenaphthene	4	1000	1000	NS	0.59 U	0.33 U	0.18 U
Acenaphthylene	1	600	10	NS	0.59 U	0.33 U	0.18 U
Acetophenone	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
Aniline	NS	NS	NS	NS	0.89 U	0.49 U	0.28 U
Anthracene	1000	1000	1000	0.057	0.44 U	0.25 U	0.14 U
Azobenzene	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
Benzo(a)anthracene	7	7	7	0.11	0.44 U	0.25 U	0.14 U
Benzo(a)pyrene	2	2	2	0.15	0.59 U	0.33 U	0.18 U
Benzo(b)fluoranthene	7	7	7	NS	0.44 U	0.25 U	0.14 U
Benzo(ghi)perylene	1000	1000	1000	NS	0.59 U	0.33 U	0.18 U
Benzo(k)fluoranthene	70	70	70	NS	0.44 U	0.25 U	0.14 U
Bis(2-chloroethoxy)methane	NS	NS	NS	NS	0.8 U	0.44 U	0.25 U
Bis(2-chloroethyl)ether	0.7	0.7	2	NS	0.67 U	0.37 U	0.21 U
Bis(2-chloroisopropyl)ether	0.7	0.7	30	NS	0.89 U	0.49 U	0.28 U
Bis(2-Ethylhexyl)phthalate	90	90	90	NS	0.74 U	0.41 U	0.23 U
Butyl benzyl phthalate	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
Chrysene	70	70	70	0.17	0.44 U	0.25 U	0.14 U
Di-n-butylphthalate	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
Di-n-octylphthalate	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
Dibenzo(a,h)anthracene	0.7	0.7	0.7	0.033	0.44 U	0.25 U	0.14 U
Dibenzofuran	NS	NS	NS	NS	0.74 U	0.41 U	0.23 U
Diethyl phthalate	10	200	300	NS	0.74 U	0.41 U	0.23 U
Dimethyl phthalate	0.7	50	600	NS	0.74 U	0.41 U	0.23 U
Fluoranthene	1000	1000	1000	0.42	0.44 U	0.25 U	0.14 U
Fluorene	1000	1000	1000	0.077	0.74 U	0.41 U	0.23 U
Hexachlorobenzene	0.7	0.7	0.7	NS	0.44 U	0.25 U	0.14 U
Hexachlorobutadiene	30	30	30	NS	0.74 U	0.41 U	0.23 U
Hexachloroethane	0.7	3	50	NS	0.59 U	0.33 U	0.18 U
Indeno(1,2,3-cd)Pyrene	7	7	7	NS	0.59 U	0.33 U	0.18 U
Isophorone	NS	NS	NS	NS	0.67 U	0.37 U	0.21 U
Naphthalene	4	20	500	0.18	0.74 U	0.41 U	0.23 U
Nitrobenzene	NS	NS	NS	NS	0.67 U	0.37 U	0.21 U
Pentachlorophenol	3	3	3	NS	1.5 U	0.82 U	0.46 U
Phenanthrene	10	500	500	0.2	0.44 U	0.25 U	0.14 U
Phenol	1	50	20	NS	0.74 U	0.41 U	0.23 U
Pyrene	1000	1000	1000	0.2	0.44 U	0.25 U	0.14 U

* = Massachusetts Stage I Freshwater Sediment Screening Criteria

U = Analyzed but not found; detection limit listed

NS = No Standard for Indicated Parameter

= Red shade Indicates an exceedances of MCP Method 1 S-1 Standard

= Blue Hatching Indicates an exceedances of Sediment Screening Criteria

TABLE 5-2
SEDIMENT INORGANIC, PESTICIDE, AND POLY-CHLORINATED BIPHENYLS (PCBs) ANALYSIS SUMMARY

PARAMETER	Risk Characterization Standards (mg/kg)			Sediment Screening Criteria (mg/kg) *	RESULTS (mg/l)		
	S-1/GW-1	S-1/GW-2	S-1/GW-3		**SD-1**	**SD-2**	**SD-3**
TOTAL METALS							
Arsenic	20	20	20	33	1.8 U	1.9 U	0.75
Barium	1000	1000	1000	NS	**74**	**63**	**12**
Cadmium	70	70	70	5	1.8 U	1.9 U	0.53 U
Calcium	NS	NS	NS	NS	**3500**	**1900**	**700**
Chromium	100	100	100	110	**3.7**	**2.7**	**2.3**
Copper	NS	NS	NS	150	**19**	**4.9**	**2.6**
Iron	NS	NS	NS	NS	**2000**	**1900**	**3100**
Lead	200	200	200	130	**61**	**24**	**6.8**
Manganese	NS	NS	NS	NS	**44**	**26**	**66**
Mercury	20	20	20	0.18	**0.323**	0.171 U	0.094 U
Selenium	400	400	400	NS	8.9 U	9.7 U	2.6 U
Silver	100	100	100	NS	1.8 U	1.9 U	0.53 U
Sodium	NS	NS	NS	NS	360 U	390 U	100 U
Zinc	1000	1000	1000	460	**48**	**11**	**17**
ORGANOCHLORINE PESTICIDES							
4,4'-DDD	8	8	8	0.0049	0.0345 U	0.02 U	0.011 U
4,4'-DDE	6	6	6	0.0032	0.0345 U	0.02 U	0.011 U
4,4'-DDT	6	6	6	0.0042	0.0646 U	0.0375 U	0.0206 U
Aldrin	0.08	0.08	0.08	NS	0.0345 U	0.02 U	0.011 U
Alpha-BHC	NS	NS	NS	NS	0.0144 U	0.00834 U	0.00459 U
Beta-BHC	NS	NS	NS	NS	0.0345 U	0.02 U	0.011 U
Chlordane	5	5	5	0.0032	0.28 U	0.162 U	0.0895 U
Delta-BHC	NS	NS	NS	NS	0.0345 U	0.02 U	0.011 U
Dieldrin	0.08	0.08	0.08	0.0019	0.0215 U	0.0125 U	0.00688 U
Endosulfan I	0.5	300	1	NS	0.0345 U	0.02 U	0.011 U
Endosulfan II	0.5	300	1	NS	0.0345 U	0.02 U	0.011 U
Endosulfan sulfate	NS	NS	NS	NS	0.0144 U	0.00834 U	0.00459 U
Endrin	10	10	10	0.0022	0.0144 U	0.00834 U	0.00459 U
Endrin ketone	NS	NS	NS	NS	0.0345 U	0.02 U	0.011 U
Heptachlor	0.3	0.3	0.3	NS	0.0172 U	0.01 U	0.0055 U
Heptachlor epoxide	0.1	0.1	0.1	0.0025	0.0646 U	0.0375 U	0.0206 U
Hexachlorobenzene	0.7	0.7	0.7	NS	0.0345 U	0.02 U	0.011 U
Lindane	0.003	1	0.5	0.0024	0.0115 U	0.00667 U	0.00367 U
Methoxychlor	200	200	200	NS	0.0646 U	0.0375 U	0.0206 U
POLY-CHLORINATED BIPHENYLS (PCBs)							
Aroclor 1016	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1221	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1232	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1242	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1248	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1254	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1260	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1262	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Aroclor 1268	1	1	1	0.060	0.148 U	0.0822 U	0.045 U
Total PCBs	1	1	1	0.060	0.148 U	0.0822 U	0.045 U

* = Massachusetts Stage I Freshwater Sediment Screening Criteria

U = Analyzed but not found; detection limit listed

NS = No Standard for Indicated Parameter

= Red shade Indicates an exceedances of MCP Method 1 S-1 Standard

= Blue Hatching Indicates an exceedances of Sediment Screening Criteria

TABLE 6-1
PRIVATE RESIDENTIAL WELL VOLATILE ORGANIC COMPOUND (VOC) ANALYSIS SUMMARY

COMPOUND	Risk Characterization Standards (ug/l)		RESULTS (ug/l)	
	DWS	GW-1	PW-265	PW-266
1,1,1,2-Tetrachloroethane	NS	5	1 U	1 U
1,1,1-Trichloroethane	200	200	1 U	1 U
1,1,2,2-Tetrachloroethane	NS	2	1 U	1 U
1,1,2-Trichloroethane	5	5	1 U	1 U
1,1-Dichloroethane	70 (G)	70	1 U	1 U
1,1-Dichloroethene	7	7	1 U	1 U
1,1-Dichloropropene	NS	NS	2 U	2 U
1,2,3-Trichlorobenzene	NS	NS	2 U	2 U
1,2,3-Trichloropropane	NS	NS	2 U	2 U
1,2,4-Trichlorobenzene	70	70	2 U	2 U
1,2,4-Trimethylbenzene	NS	NS	2 U	2 U
1,2-Dibromo-3-chloropropane	0.2	NS	2 U	2 U
1,2-Dibromoethane	NS	0.02	2 U	2 U
1,2-Dichlorobenzene	600	600	1 U	1 U
1,2-Dichloroethane	5	5	1 U	1 U
1,2-Dichloroethene (total)	NS	NS	1 U	1 U
1,2-Dichloropropane	5	5	1 U	1 U
1,3,5-Trimethylbenzene	NS	NS	2 U	2 U
1,3-Dichlorobenzene	NS	100	1 U	1 U
1,3-Dichloropropane	NS	NS	2 U	2 U
1,3-Dichloropropene, Total	NS	0.4	0.5 U	0.5 U
1,4-Dichlorobenzene	5	5	1 U	1 U
1,4-Dioxane *	0.3 (G)	0.3	0.15 U	0.143 U
2,2-Dichloropropane	NS	NS	2 U	2 U
2-Butanone (MEK)	4000 (G)	4000	5 U	5 U
2-Hexanone (MBK)	NS	NS	5 U	5 U
4-Methyl-2-pentanone	NS	350	5 U	5 U
Acetone	6300 (G)	6300	5 U	5 U
Benzene	5	5	0.5 U	0.5 U
Bromobenzene	NS	NS	2 U	2 U
Bromochloromethane	NS	NS	2 U	2 U
Bromodichloromethane	NS	3	1 U	1 U
Bromoform	NS	4	2 U	2 U
Bromomethane	10	10	2 U	2 U
Carbon disulfide	NS	NS	2 U	2 U
Carbon tetrachloride	5	5	1 U	1 U
Chlorobenzene	100	100	1 U	1 U
Chloroethane	NS	NS	2 U	2 U
Chloroform	70	70	1 U	1 U
Chloromethane	NS	NS	2 U	2 U
cis-1,2-Dichloroethene	70	70	1 U	1 U
cis-1,3-Dichloropropene	NS	0.4	0.5 U	0.5 U
Dibromochloromethane	NS	2	1 U	1 U
Dibromomethane	NS	NS	2 U	2 U
Dichlorodifluoromethane	1400 (G)	NS	2 U	2 U
Ethyl ether	NS	NS	2 U	2 U
Ethyl-Tert-Butyl-Ether	NS	NS	2 U	2 U
Ethylbenzene	700	700	1 U	1 U
Hexachlorobutadiene	NS	0.6	0.6 U	0.6 U
Isopropyl Ether	NS	NS	2 U	2 U
Isopropylbenzene	NS	NS	2 U	2 U
Methyl tert butyl ether	70 (G)	70	2 U	2 U
Methylene chloride	NS	5	2 U	2 U
n-Butylbenzene	NS	NS	2 U	2 U
n-Propylbenzene	NS	NS	2 U	2 U
Naphthalene	140 (G)	140	2 U	2 U
o-Chlorotoluene	NS	NS	2 U	2 U
o-Xylene	10000	10000	1 U	1 U
p-Chlorotoluene	NS	NS	2 U	2 U
p-Isopropyltoluene	NS	NS	2 U	2 U
p/m-Xylene	10000	10000	2 U	2 U
sec-Butylbenzene	NS	NS	2 U	2 U
Styrene	100	100	1 U	1 U
tert-Butylbenzene	NS	NS	2 U	2 U
Tertiary-Amyl Methyl Ether	90 (G)	NS	2 U	2 U
Tetrachloroethene	5	5	1 U	1 U
Tetrahydrofuran	600	NS	2 U	2 U
Toluene	1000	1000	1 U	1 U
trans-1,2-Dichloroethene	100	100	1 U	1 U
trans-1,3-Dichloropropene	NS	0.4	0.5 U	0.5 U
Trichloroethene	5	5	1 U	1 U
Trichlorofluoromethane	NS	NS	2 U	2 U
Vinyl chloride	2	2	1 U	1 U
Xylene (Total)	10000	10000	1 U	1 U

DWS = Massachusetts Drinking Water Standard or Guideline
(G) = Massachusetts Drinking Water Guideline
U = Analyzed but not found; detection limit listed
* = 1,4-Dioxane repoted by Method 8270-SIM
NS = No Standard for Indicated Parameter
= Red shade Indicates an exceedances of DWS or MCP Method 1 GW-1 Standard

TABLE 6-2
PRIVATE RESIDENTIAL WELL INORGANIC ANALYSIS SUMMARY

PARAMETER	Risk Characterization Standards (ug/l)		**RESULTS (ug/l)**	
	DWS	GW-1	**PW-265**	**PW-266**
GENERAL CHEMISTRY				
Alkalinity (mg/l of $CaCO^3$)	NS	NS	**52.5**	**46.8**
Total Dissloved Solids	500000 (S)	NS	**110000**	**160000**
Cyanide, Total	200	200	**5**	5 U
Chloride	250000 (S)	NS	**13000**	**16000**
Nitrogen, Nitrate	10000	NS	100 U	**2990**
Sulfate	250000 (S)	NS	**31000**	**27000**
Chemical Oxygen Demand	NS	NS	20000 U	20000 U
DISSOLVED METALS				
Arsenic	10	10	5 U	10 U
Barium	2000	2000	**27**	**22**
Cadmium	5	5	4 U	8 U
Calcium	NS	NS	**18000**	**19000**
Chromium	100	100	10 U	20 U
Copper	1300/1000(S)	NS	**27**	20 U
Iron	300 (S)	NS	**120**	**240**
Lead	15	15	10 U	20 U
Manganese	50 (S)	NS	**44**	20 U
Mercury	2	2	0.2 U	0.2 U
Selenium	50	50	10 U	20 U
Silver	100 (S)	100	7 U	14 U
Sodium	20000 (G)	NS	**14000**	**13000**
Zinc	5000	5000	50 U	100 U

DWS = Massachusetts Drinking Water Standard
(S) = Secondary Drinking Water Standard
(G) = Massachusetts Drinking Water Guideline
U = Analyzed but not found; detection limit listed
NS = No Standard for Indicated Parameter
= Yellow shade Indicates an exceedance of Secondary Maximum Contaminant Levels
= Red shade Indicates an exceedance of DWS or MCP Method 1 GW-1 Standard

TABLE 7
SOIL PROBE SCREENING RESULTS

Probe Location	September 24, 2014				
	% LEL	% CH_4	H_2S	%CO	VOCs
GP-1	000	0	0	0	0.0
GP-2	000	0	0	0	0.0
GP-3	000	0	0	0	0.0
GP-4	000	0	0	0	0.0
GP-5	000	0	0	0	0.0

% CH_4 = Percent by Volume of Methane
% O_2 = Percent by Volume of Oxygen
% LEL = Percent of Lower Explosive Limit
H_2S = Hydrogen Sulfide in parts per million (ppm)
VOCs = Total Volatile Organic Compounds volume/volume as "Isobutylene"

TABLE 8-1
SOIL VOLATILE ORGANIC COMPOUND (VOC) ANALYSIS SUMMARY

COMPOUND	Risk Characterization Standards (mg/kg)			**RESULTS (mg/kg)**		
	S-1/GW-1	S-1/GW-2	S-1/GW-3	**HA-1B, 0-2**	**HA-2B, 4-6**	**MW-03B, 0-2**
1,1,1,2-Tetrachloroethane	0.1	0.1	80	0.13 U	0.13 U	0.075 U
1,1,1-Trichloroethane	30	500	500	0.13 U	0.13 U	0.075 U
1,1,2,2-Tetrachloroethane	0.005	0.02	10	0.13 U	0.13 U	0.075 U
1,1,2-Trichloroethane	0.1	2	40	0.2 U	0.2 U	0.11 U
1,1-Dichloroethane	0.4	9	500	0.2 U	0.2 U	0.11 U
1,1-Dichloroethene	3	40	500	0.13 U	0.13 U	0.075 U
1,1-Dichloropropene	NS	NS	NS	0.52 U	0.52 U	0.3 U
1,2,3-Trichlorobenzene	NS	NS	NS	0.52 U	0.52 U	0.3 U
1,2,3-Trichloropropane	NS	NS	NS	0.52 U	0.52 U	0.3 U
1,2,4-Trichlorobenzene	2	6	700	0.52 U	0.52 U	0.3 U
1,2,4-Trimethylbenzene	NS	NS	NS	0.52 U	0.52 U	0.3 U
1,2-Dibromo-3-chloropropane	NS	NS	NS	0.52 U	0.52 U	0.3 U
1,2-Dibromoethane	0.1	0.1	1	0.52 U	0.52 U	0.3 U
1,2-Dichlorobenzene	9	100	300	0.52 U	0.52 U	0.3 U
1,2-Dichloroethane	0.1	0.1	20	0.13 U	0.13 U	0.075 U
1,2-Dichloroethene, Total	NS	NS	NS	0.13 U	0.13 U	0.075 U
1,2-Dichloropropane	0.1	0.1	30	0.46 U	0.46 U	0.26 U
1,3,5-Trimethylbenzene	NS	NS	NS	0.52 U	0.52 U	0.3 U
1,3-Dichlorobenzene	3	100	100	0.52 U	0.52 U	0.3 U
1,3-Dichloropropane	NS	NS	NS	0.52 U	0.52 U	0.3 U
1,3-Dichloropropene, Total	0.01	0.4	20	0.13 U	0.13 U	0.075 U
1,4-Dichlorobenzene	0.7	1	80	0.52 U	0.52 U	0.3 U
1,4-Dioxane	0.2	6	20	13 U	13 U	7.5 U
2,2-Dichloropropane	NS	NS	NS	0.65 U	0.65 U	0.38 U
2-Hexanone	NS	NS	NS	1.3 U	1.3 U	0.75 U
Acetone	6	50	400	4.7 U	4.7 U	2.7 U
Benzene	2	40	40	0.13 U	0.13 U	0.075 U
Bromobenzene	NS	NS	NS	0.65 U	0.65 U	0.38 U
Bromochloromethane	NS	NS	NS	0.52 U	0.52 U	0.3 U
Bromodichloromethane	0.1	0.1	30	0.13 U	0.13 U	0.075 U
Bromoform	0.1	1	300	0.52 U	0.52 U	0.3 U
Bromomethane	0.5	0.5	30	0.26 U	0.26 U	0.15 U
Carbon disulfide	NS	NS	NS	0.52 U	0.52 U	0.3 U
Carbon tetrachloride	10	5	30	0.13 U	0.13 U	0.075 U
Chlorobenzene	1	3	100	0.13 U	0.13 U	0.075 U
Chloroethane	NS	NS	NS	0.26 U	0.26 U	0.15 U
Chloroform	0.4	0.2	500	0.2 U	0.2 U	0.11 U
Chloromethane	NS	NS	NS	0.52 U	0.52 U	0.3 U
cis-1,2-Dichloroethene	0.3	0.1	100	0.13 U	0.13 U	0.075 U
cis-1,3-Dichloropropene	0.01	0.4	20	0.13 U	0.13 U	0.075 U
Dibromochloromethane	0.005	0.03	20	0.13 U	0.13 U	0.075 U
Dibromomethane	NS	NS	NS	0.52 U	0.52 U	0.3 U
Dichlorodifluoromethane	NS	NS	NS	1.3 U	1.3 U	0.75 U
Diethyl ether	NS	NS	NS	0.65 U	0.65 U	0.38 U
Diisopropyl Ether	NS	NS	NS	0.52 U	0.52 U	0.3 U
Ethyl-Tert-Butyl-Ether	NS	NS	NS	0.52 U	0.52 U	0.3 U
Ethylbenzene	40	500	500	0.13 U	0.13 U	0.075 U
Hexachlorobutadiene	30	30	30	0.52 U	0.52 U	0.3 U
Isopropylbenzene	NS	NS	NS	0.13 U	0.13 U	0.075 U
Methyl ethyl ketone	4	50	400	1.3 U	1.3 U	0.75 U
Methyl isobutyl ketone	0.4	50	400	1.3 U	1.3 U	0.75 U
Methyl tert butyl ether	0.1	100	100	0.26 U	0.26 U	0.15 U
Methylene chloride	0.1	4	400	1.3 U	1.3 U	0.75 U
n-Butylbenzene	NS	NS	NS	0.13 U	0.13 U	0.075 U
n-Propylbenzene	NS	NS	NS	0.13 U	0.13 U	0.075 U
Naphthalene	4	20	500	0.52 U	0.52 U	0.3 U
o-Chlorotoluene	NS	NS	NS	0.52 U	0.52 U	0.3 U
o-Xylene	400	100	500	0.26 U	0.26 U	0.15 U
p-Chlorotoluene	NS	NS	NS	0.52 U	0.52 U	0.3 U
p-Isopropyltoluene	NS	NS	NS	0.13 U	0.13 U	0.075 U
p/m-Xylene	400	100	500	0.26 U	0.26 U	0.15 U
sec-Butylbenzene	NS	NS	NS	0.13 U	0.13 U	0.075 U
Styrene	3	4	70	0.26 U	0.26 U	0.15 U
tert-Butylbenzene	NS	NS	NS	0.52 U	0.52 U	0.3 U
Tertiary-Amyl Methyl Ether	NS	NS	NS	0.52 U	0.52 U	0.3 U
Tetrachloroethene	1	10	30	0.13 U	0.13 U	0.075 U
Tetrahydrofuran	NS	NS	NS	0.52 U	0.52 U	0.3 U
Toluene	30	500	500	0.2 U	0.2 U	0.11 U
trans-1,2-Dichloroethene	1	1	500	0.2 U	0.2 U	0.11 U
trans-1,3-Dichloropropene	0.01	0.4	20	0.13 U	0.13 U	0.075 U
Trichloroethene	0.3	0.3	30	0.13 U	0.13 U	0.075 U
Trichlorofluoromethane	NS	NS	NS	0.52 U	0.52 U	0.3 U
Vinyl chloride	0.9	0.7	1	0.26 U	0.26 U	0.15 U
Xylenes, Total	400	100	500	0.26 U	0.26 U	0.15 U

U = Analyzed but not found; detection limit listed

NS = No Standard for Indicated Parameter

= Red shade Indicates an exceedances of MCP Method 1 S-1 Standard

TABLE 8-2
INORGANIC SOIL ANALYSIS SUMMARY

PARAMETER	Risk Characterization Standards (mg/kg)			**RESULTS (mg/l)**		
	S-1/GW-1	S-1/GW-2	S-1/GW-3	**HA-1B, 0-2**	**HA-2B, 4-6**	**MW-03B, 0-2**
GENERAL CHEMISTRY						
Cyanide, Total	30	30	30	1.1 U	1.2 U	1 U
METALS						
Arsenic	20	20	20	3.6	3	6.6
Barium	1000	1000	1000	37	60	17
Cadmium	70	70	70	0.89	1 U	0.44 U
Calcium	NS	NS	NS	840	2000	170
Chromium	100	100	100	5	6.8	10
Copper	NS	NS	NS	14	22	7.7
Iron	NS	NS	NS	8200	4800	14000
Lead	200	200	200	180	150	7.1
Manganese	NS	NS	NS	88	99	75
Mercury	20	20	20	0.123	0.121	0.077 U
Selenium	400	400	400	2.2 U	5 U	2.2 U
Silver	100	100	100	0.44 U	1 U	0.44 U
Sodium	NS	NS	NS	87 U	200 U	88 U
Zinc	1000	1000	1000	100	130	19

U = Analyzed but not found; detection limit listed

NS = No Standard for Indicated Parameter

= Red shade Indicates an exceedances of MCP Method 1 S-1 Standard